9-1090-206-20-1

TM 9-1090-206-20-1

SUPERSEDES COPY DATED APRIL 1981

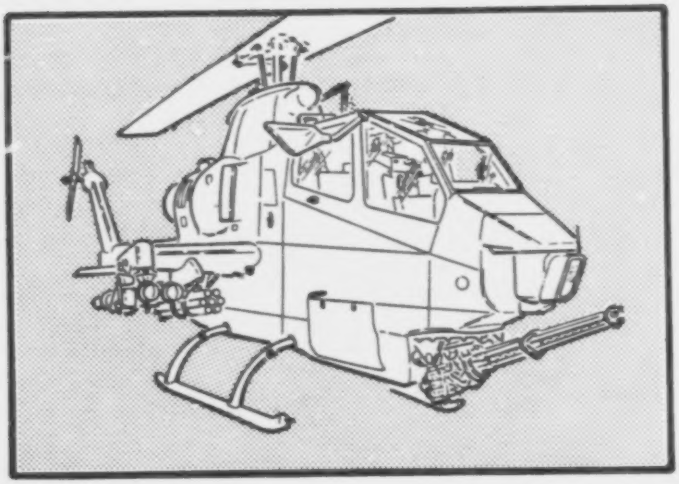
This copy is a reprint which includes current pages from Change 1.

AVIATION UNIT MAINTENANCE MANUAL

FOR

20-MM AUTOMATIC GUN HELICOPTER ARMAMENT SUBSYSTEM: M97A2

PN 9324960 (1005-01-100-4469)



HOW TO USE THIS MANUAL PAGE iv

OPERATIONAL CHECKS AND SERVICES PAGE 2-2

HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP PAGE 2-10

AVIATION UNIT MAINTENANCE INSTRUCTIONS PAGE 3-1

PREVENTIVE MAINTENANCE CHECKS AND SERVICES PAGE 3-2

SYSTEM TESTING AND TROUBLESHOOTING PAGE 3-23

FAULT SYMPTOM INDEX PAGE 3-26

150 HOUR ARMAMENT SUBSYSTEM CHECK PAGE G-1

GLOSSARY PAGE GLOSSARY 1

INDEX PAGE INDEX 1

HEADQUARTERS, DEPARTMENT OF THE ARMY

MARCH 1986

READEX FICHE best copy available

D/01/11

SUMMARY OF WARNINGS AND FIRST AID

The list summarizes critical WARNINGS in this manual. They are repeated here to let you know how important they are. Study these WARNINGS carefully; they can save your life and the lives of soldiers you work with.

WARNING

Personnel performing instructions involving operations, procedures, and practices which are included or implied in this technical manual shall observe the following instructions. Disregard of these warnings and precautionary information can cause serious injury or DEATH.

Read How to Use This Manual, Chapter 1, Chapter 2, Chapter 3, and perform HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP before starting any inspection, check, service, alinement or maintenance procedures.

HIGH VOLTAGE

WARNING

Personnel performing maintenance, adjustments, and/or troubleshooting in or around the turret subsystem shall be aware that the system uses and generates HIGH voltages which can cause injury or DEATH. Good practices, considering local conditions, shall be observed.

Care shall be exercised, when using metal tools, that circuits are not shorted. Some circuits have high current capability which when shorted will flash and may cause burns and/or eye injury.

Remove all jewelry and exposed metal objects from body and clothing before performing maintenance, adjustments, and/or troubleshooting to prevent personal injury.

SAFING INSPECTION

WARNING

DANGER
laser light

The laser beam is dangerous and can cause blindness if it enters the eye either directly or if reflected from a shiny surface. Laser light leakage due to improper mounting of the TSU window cover may cause injury to the eye.

All jettison safety pins shall be installed when the helicopter is on the ground and while maintenance is being performed. Serious injury could result from accidental jettison. Safety pins shall be removed before flight so emergency jettison of wing stores can be accomplished.

Gun barrels may be hot. Use heat protective mittens when handling hot barrels.

Cook off may occur when live ammunition is chambered in hot weapons. A 20-minute cool down of the weapon should be observed from the time stoppage occurs.

Keep fingers and foreign material clear of feed chute, M197 gun, and M89E1 feeder.

Hearing protection such as ear plugs must be used by all personnel in and around the helicopter during its operation.

Observe all precautions governing care and handling of live ammunition.

Interruption of power to the armament system, for example because of accidentally switching off the MASTER ARM, results in the gun going to stow at the rate of 80 degrees per second. This could cause injury to personnel or damage to equipment.

Stay clear of turning main and tail rotor blades.

Check that all wing stores are unloaded before safing M197 gun.

Do not walk in front of M197 gun prior to verification of a safe weapon.

If disarming/safing is being performed with power on helicopter, do not enter 110° left and right azimuth zone of barrel travel — do not put hand up into turret — barrels may be hot.

LOADING/DOWNLOADING

WARNING

A fully loaded ammunition box weighs approximately 500 pounds.

Warn people working on or near helicopter before applying electrical power.

OPERATION, CHECKOUT, AND MAINTENANCE

WARNING

Operation and maintenance of the turret subsystem shall be performed only by authorized personnel. Verify that the HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP has been performed prior to performing any operation, checkout, or maintenance procedures. All safety precautions and regulations shall be observed. Personnel shall remain clear of hazardous area bounded by safety barricade.

Failure to perform a bore erosion test at scheduled intervals may result in ruptured barrels when the gun is fired and cause death or injury to personnel and damage to equipment.

Keep fingers clear of rotor, breech bolts, and other moveable parts to avoid injury to fingers if barrel cluster is accidently rotated.

Exercise extreme care when hand feeding dummy rounds. Support rounds very lightly with finger tips and do not place fingers between rounds and rotor in direction of rotation.

Gun can be fired from the gunner cyclic stick with MASTER ARM switch set to OFF if PLT ORIDE switch is set to PLT ORIDE.

Do not put hands between lower support and saddle, personal injury could result.

Improper installation of barrels could allow barrel cluster to separate from M197 gun and result in injury to personnel and damage to equipment.

To avoid injury, do not put hands between turret and saddle.

To avoid injury, keep hands clear of rotor housing when turning rotor.

WARNING

Make sure that the turret system, the rockets, and the TOW missile launchers are downloaded and that no live rounds remain in gun or feeder before performing any checks or procedures.

The laminated shim has extremely sharp edges. Handle shim carefully to avoid injury.

Wear suitable eye/ear protection to avoid injury.

When removing/installing firing cam pin, firing pin may be propelled from breech bolt body with sufficient force to cause injury to personnel. Hold aft face of breech bolt body on working surface so firing pin will be retained within breech bolt body.

Exercise care when working on feed chute. Sharp edges may cause injury.

CLEANING

Do not use flammable materials near fire or an open flame. Most cleaning materials are harmful or fatal if swallowed. Use adequate ventilation. Avoid contact with skin and prolonged breathing of vapors.

Cleaning solvents evaporate quickly and have a drying effect on the skin. Gloves will be worn to avoid cracks in the skin, and in some cases mild irritation or inflammation of the skin.

Use and disposal of flammable and toxic materials will be in accordance with applicable regulations.

QUICK CHECK BORESIGHT

WARNING

Verify that power is removed from turret drive motors before using universal boresight kit to check that weapon firing barrel is alined to target.

JAMS

WARNING

Clear gun and feeder. Follow a clearing procedure based on type of malfunction encountered. Observe all safety precautions.

AMMUNITION

WARNING

Rechambering of live ammunition is prohibited. The use of previously chambered cartridges may result in damage to equipment or injury to personnel due to cartridge hangfire. Propellant-primer contamination, a cause of hangfire, can occur because the chambering action may loosen the projectile in the cartridge case and break the waterproof seal. Any cartridges that have been chambered and later extracted unfired will be disposed of in accordance with TM 9-1300-206 and/or local regulations.

150 HOUR ARMAMENT SUBSYSTEM CHECK

WARNING

Do not touch airspeed and direction sensor probe when ADS ANTI ICE circuit breaker is closed. probe can become very hot.

FIRST AID

See FM 21-11 for artificial respiration and first aid procedures.

WARNING

Make sure that the turret system, the rockets, and the TOW missile launchers are downloaded and that no live rounds remain in gun or feeder before performing any checks or procedures.

TECHNICAL MANUAL
9-1090-206-20-1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D C

3 March 1986

Aviation Unit Maintenance Manual
For
20-MM AUTOMATIC GUN HELICOPTER ARMAMENT SUBSYSTEM: M97A2
PN 9324960 (1005-01-100-4469)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Commander, US Army Armament, Munitions and Chemical Command, ATTN: AMSMC-MAS, Rock Island, IL 61299-6000. A reply will be furnished to you.

Distribution authorized to U.S. Government agencies and their contractors. This publication is required for administration and operational purposes. Other requests for this document shall be referred to Commander, U.S. Army Armament, Munitions and Chemical Command, ATTN: AMSMC-MAS, Rock Island, IL 61299-6000.
For unclassified, limited documents, destroy by any method that will prevent disclosure of contents or reconstruction of the document.

		Page
	HOW TO USE THIS MANUAL	iv
CHAPTER 1	INTRODUCTION	1-1
Section 1	General Information	1-1
Section II	Equipment Description and Data	1-5
Section III	Principles of Operation	1-54
CHAPTER 2	GROUND CREW OPERATIONAL INSTRUCTIONS	2-1
Section I	Service Upon Receipt	2-1
Section II	Operational Checks and Services	2-2
CHAPTER 3	AVIATION UNIT MAINTENANCE INSTRUCTIONS	3-1
Section I	Lubrication Instructions	3-1
Section II	Repair Parts, Special Tools; Test, Measurement, and Diagnostic Equipment (TMDE); and Support Equipment	3-2

***This manual, together with TM 9-1090-206-20-2, 3 March 1986, supersedes TM 9-1090-206-12, 13 April 1981.**

Page

Section III Preventive Maintenance Checks and Services 3-2

Section IV General Maintenance Instructions 3-14

Section V System Testing and Troubleshooting 3-23

Section VI Line Replaceable Unit Checks 3-128
Section VII Maintenance of M89E1 Feeder 3-169
Section VIII Maintenance of M197 Gun 3-209
Section IX Maintenance of Gun Drive 3-293
Section X Maintenance of Recoil Adapter and Slider 3-297
Section XI Maintenance of Turret 3-301
Section XII Maintenance of Ammunition Feed System 3-335
Section XIII Maintenance of Emergency Stow Control Unit 3-371
Section XIV Maintenance of Logic Control Unit 3-377
Section XV Maintenance of Gun Control Unit 3-381
Section XVI Maintenance of Turret Control Unit 3-385
Section XVII Maintenance of Gunner Armament Control Panel 3-391
Section XVIII Maintenance of Pilot Armament Control Panel 3-395
Section XIX Maintenance of Interface Control Unit 3-399
Section XX Maintenance of Turret Buffer Amplifier 3-403
Section XXI Maintenance of Logic Relay Assembly 3-407
Section XXII Maintenance of Acquisition Switch Panel and Switch 3-413
Section XXIII Maintenance of Airspeed Transducer 3-419

CHAPTER 4 MAINTENANCE OF AUXILIARY EQUIPMENT 4-1
Section I Maintenance of Universal Boresight Kit 4-1
Section II Maintenance of 20-mm Barrel Erosion Gage 4-3

CHAPTER 5 AMMUNITION 5-1
Section I General 5-1
Section II Preparation for Firing 5-5
Section III Care, Handling, and Preservation 5-5

APPENDIX A REFERENCES A-1

APPENDIX B MAINTENANCE ALLOCATION CHART B-1
Section I Introduction B-1
Section II Maintenance Allocation Chart B-3
Section III Tool and Test Equipment Requirements B-29
Section IV Remarks B-31

APPENDIX C REPAIR PARTS AND SPECIAL TOOLS LIST C-1

APPENDIX D EXPENDABLE SUPPLIES AND MATERIALS LIST D-1
Section I Introduction D-1
Section II Expendable Supplies and Materials D-2

		Page
APPENDIX E	ILLUSTRATED LIST OF MANUFACTURED ITEMS	E-1
APPENDIX F	TORQUE LIMITS	F-1
APPENDIX G	150 HOUR HELICOPTER ARMAMENT SUBSYSTEM CHECK	G-1
GLOSSARY		Glossary 1
INDEX		Index 1

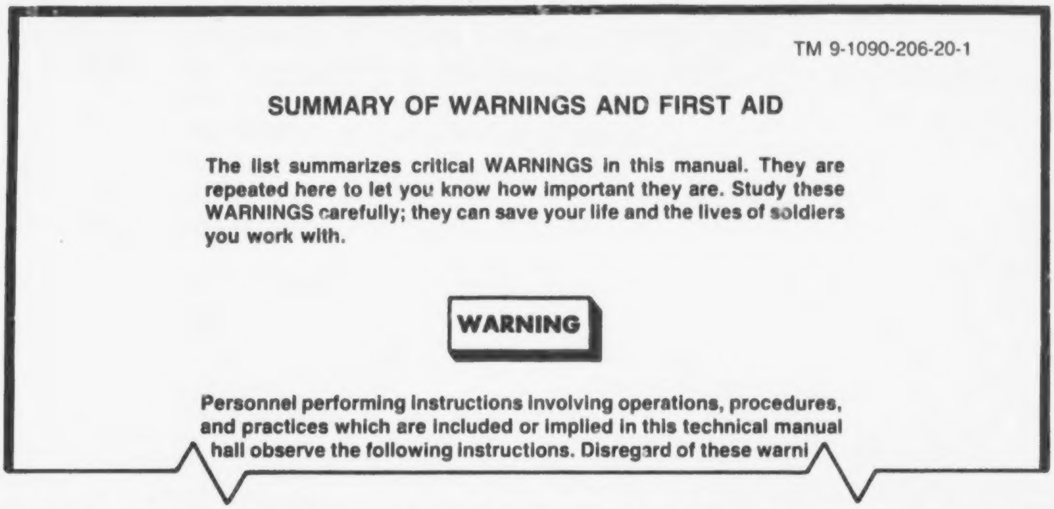
HOW TO USE THIS MANUAL

This manual covers Aviation Unit Maintenance (AVUM) level maintenance support tasks for the 20-mm Automatic Gun Helicopter Armament Subsystem M97A2.

Use the front cover locators and edge marked pages to quickly find parts of the manual identified on the cover.

Before starting any inspection or maintenance procedures, read HOW TO USE THIS MANUAL, CHAPTER 1 — GENERAL INFORMATION, CHAPTER 2 — GROUND CREW OPERATIONAL INSTRUCTIONS, and CHAPTER 3 — AVIATION UNIT MAINTENANCE INSTRUCTIONS; and perform HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP, para 2-6.

WHAT'S IN THE MANUAL — FRONT TO BACK



TM 9-1090-206-20-1

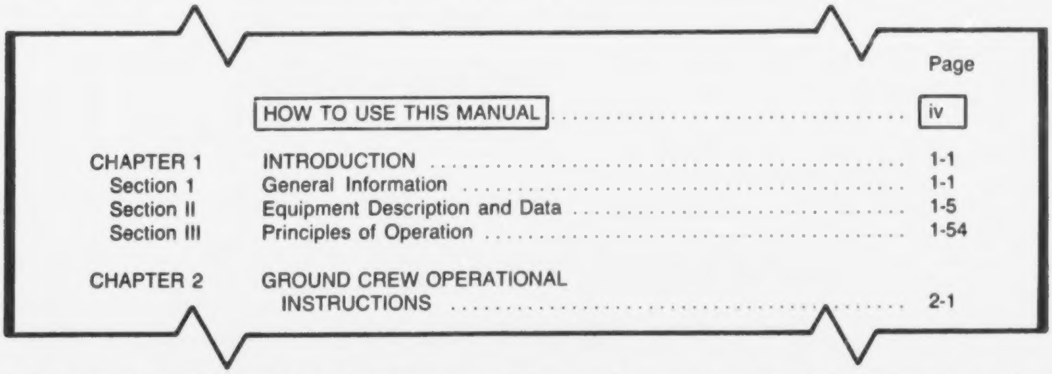
SUMMARY OF WARNINGS AND FIRST AID

The list summarizes critical WARNINGS in this manual. They are repeated here to let you know how important they are. Study these WARNINGS carefully; they can save your life and the lives of soldiers you work with.

WARNING

Personnel performing instructions involving operations, procedures, and practices which are included or implied in this technical manual hall observe the following instructions. Disregard of these warni

SUMMARY OF WARNINGS AND FIRST AID lists the warnings and first aid information in this manual. These warnings contain additional information about things that could hurt or kill personnel. The maintenance task may have a slightly different version of these warnings.



Page

HOW TO USE THIS MANUAL iv

CHAPTER 1 INTRODUCTION 1-1
Section I General Information 1-1
Section II Equipment Description and Data 1-5
Section III Principles of Operation 1-54

CHAPTER 2 GROUND CREW OPERATIONAL INSTRUCTIONS 2-1

TABLE OF CONTENTS lists the chapters, sections, and appendixes in this manual. It also lists the pages where chapters, sections, and appendixes can be found.

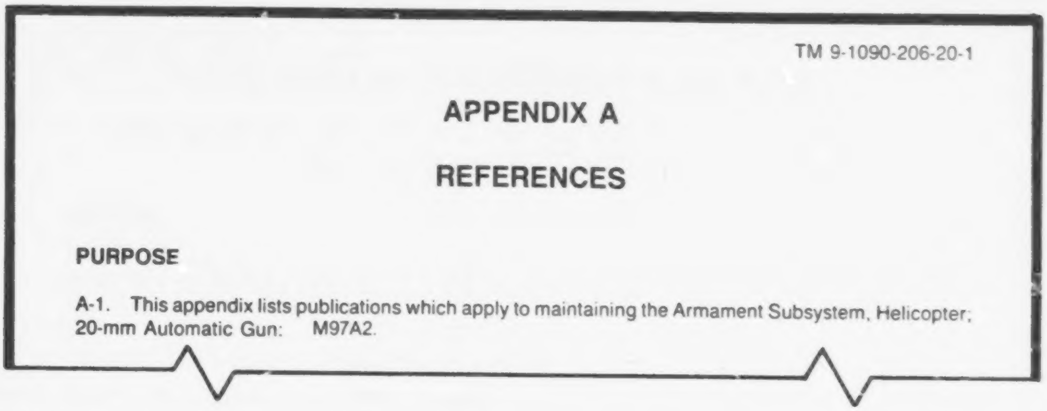
CHAPTER 1 covers general information and gives a quick review of major components and features of the 20-mm Automatic Gun Helicopter Armament Subsystem M97A2.

CHAPTER 2 contains information for Service Upon Receipt, and Operational Checks and Services. Operational checks and services includes: Safing Inspection, Downloading Ammunition, Helicopter Armament Subsystem Maintenance Setup, Electrical Power Application/Removal, Turret Subsystem Preoperational Check, Quick Check Boresight, Rocket Launcher Alinement, and Loading Ammunition.

CHAPTER 3 contains maintenance tasks authorized to be performed at the Aviation Unit Maintenance (AVUM) level.

CHAPTER 4 contains auxiliary equipment maintenance tasks authorized to be performed at the Aviation Unit Maintenance (AVUM) level.

CHAPTER 5 contains information on ammunition including Description and Identification; Preparation for Firing; and Care, Handling, and Preservation.



TM 9-1090-206-20-1

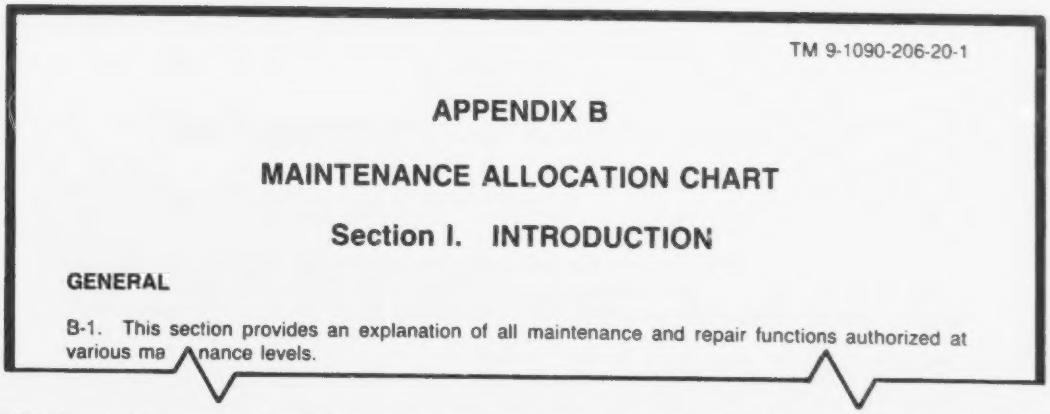
APPENDIX A

REFERENCES

PURPOSE

A-1. This appendix lists publications which apply to maintaining the Armament Subsystem, Helicopter; 20-mm Automatic Gun: M97A2.

APPENDIX A lists references such as technical manuals and other publications to be used by personnel.



TM 9-1090-206-20-1

APPENDIX B

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

GENERAL

B-1. This section provides an explanation of all maintenance and repair functions authorized at various ma nance levels.

APPENDIX B provides an explanation of all maintenance and repair functions authorized at various maintenance levels.

TM 9-1090-206-20-1

APPENDIX C

REPAIR PARTS AND SPECIAL TOOLS LIST

Refer to TM 9-1090-206-23P for repair parts and special tools.

APPENDIX C lists repair parts and special tools required for the operation and performance of aviation unit maintenance.

TM 9-1090-206-20-1

APPENDIX D

EXPENDABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

SCOPE

D-1. This appendix lists expendable supplies and materials you will need to operate and maintain the Armament S bsystem. These items are authorized to you by CTA 50-970, Expen le Items.

APPENDIX D lists expendable supplies and materials used to maintain or repair the 20-mm Automatic Gun Helicopter Armament Subsystem M97A2 .

TM 9-1090-206-20-1

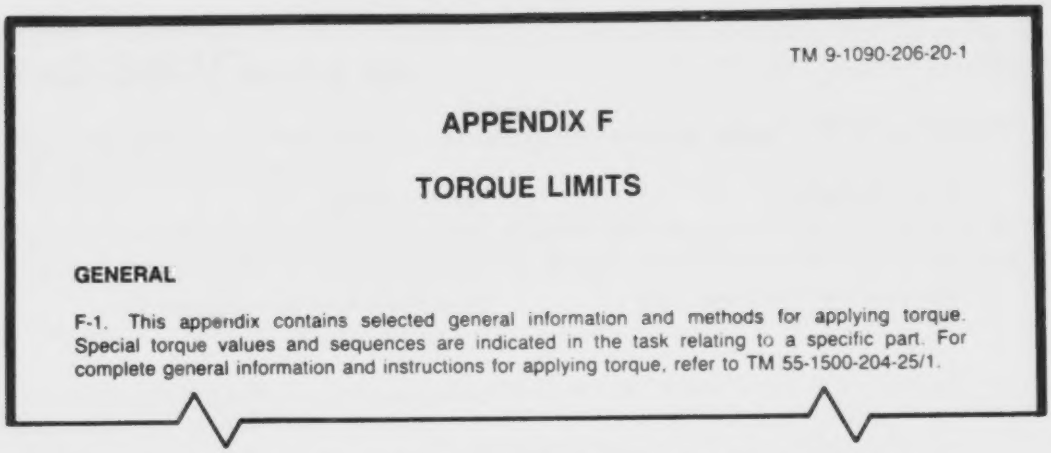
APPENDIX E

ILLUSTRATED LIST OF MANUFACTURED ITEMS

INTRODUCTION

E-1. This appendix includes complete instructions for making items authorized to be manufactured or fabricated by aviation unit maintenance personnel. A part number index in alphanumeric order is provided for cross-referencing the part number of the item to the figure which covers fabrication criteria. All bulk materials needed for manufacture of an item are identified by part number or specification number on the illust on.

APPENDIX E lists and provides instructions to make items authorized to be manufactured or fabricated by aviation unit maintenance personnel.



TM 9-1090-206-20-1

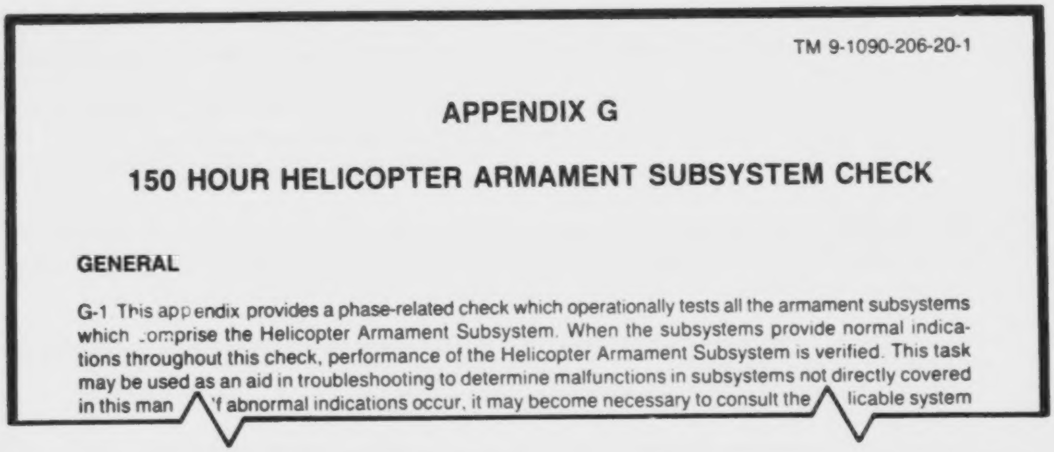
APPENDIX F

TORQUE LIMITS

GENERAL

F-1. This appendix contains selected general information and methods for applying torque. Special torque values and sequences are indicated in the task relating to a specific part. For complete general information and instructions for applying torque, refer to TM 55-1500-204-25/1.

APPENDIX F contains selected general information and methods for applying torque.



TM 9-1090-206-20-1

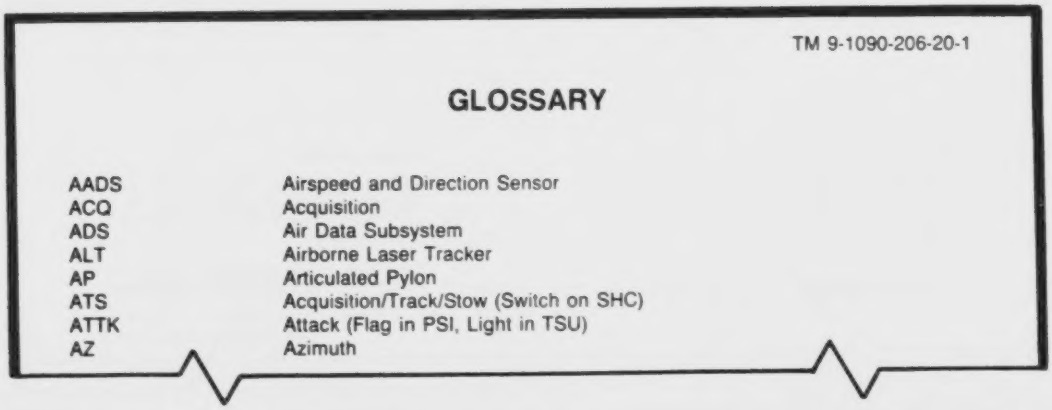
APPENDIX G

150 HOUR HELICOPTER ARMAMENT SUBSYSTEM CHECK

GENERAL

G-1 This appendix provides a phase-related check which operationally tests all the armament subsystems which comprise the Helicopter Armament Subsystem. When the subsystems provide normal indications throughout this check, performance of the Helicopter Armament Subsystem is verified. This task may be used as an aid in troubleshooting to determine malfunctions in subsystems not directly covered in this man 'f abnormal indications occur, it may become necessary to consult the licable system

APPENDIX G contains information required to determine the operational readiness condition of the armament subsystem, fire control subsystems, and interfacing aircraft systems.

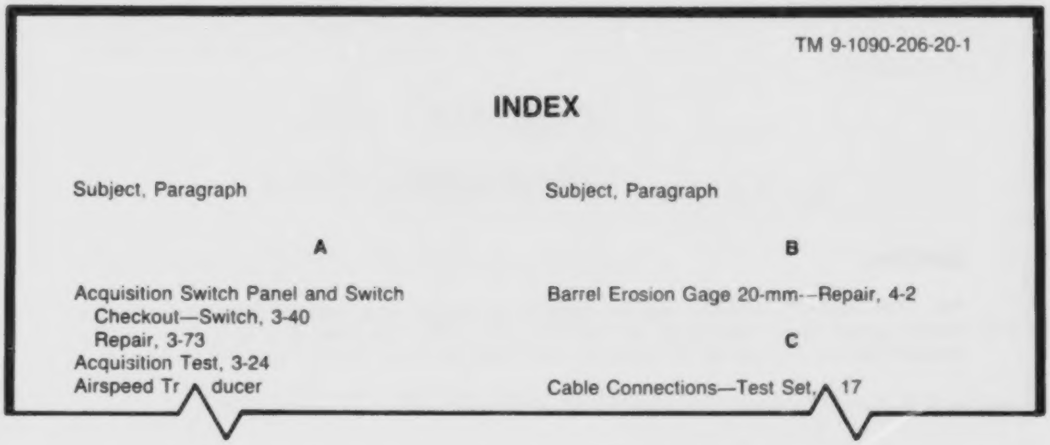


TM 9-1090-206-20-1

GLOSSARY

AADS	Airspeed and Direction Sensor
ACQ	Acquisition
ADS	Air Data Subsystem
ALT	Airborne Laser Tracker
AP	Articulated Pylon
ATS	Acquisition/Track/Stow (Switch on SHC)
ATTK	Attack (Flag in PSI, Light in TSU)
AZ	Azimuth

GLOSSARY gives the meanings of abbreviations and unusual terms found in the manual.



TM 9-1090-206-20-1

INDEX

Subject, Paragraph

A

Acquisition Switch Panel and Switch
  Checkout—Switch, 3-40
  Repair, 3-73
Acquisition Test, 3-24
Airspeed Tr ducer

Subject, Paragraph

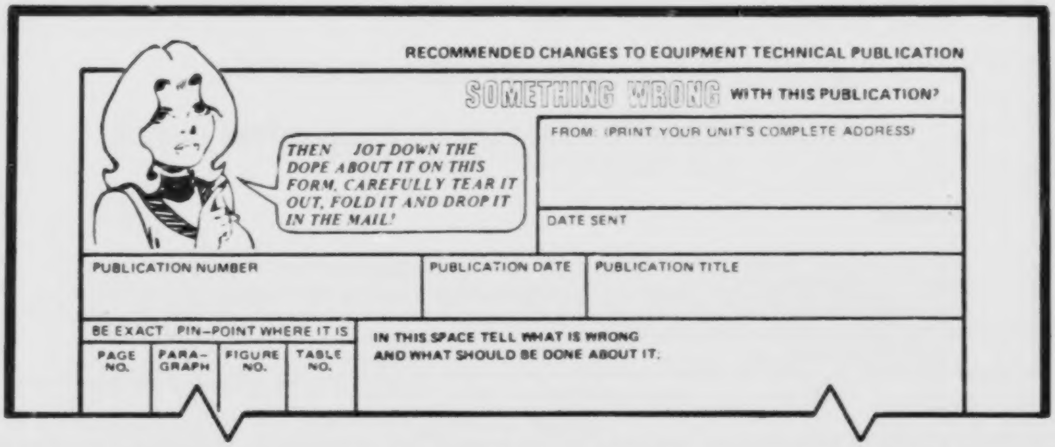
B

Barrel Erosion Gage 20-mm--Repair, 4-2

C

Cable Connections—Test Set, 17

INDEX contains an alphabetical list of important information. Usually each subject is presented in more than one way to make information easier to find.



RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATION

SOMETHING WRONG WITH THIS PUBLICATION?

THEN JOT DOWN THE DOPE ABOUT IT ON THIS FORM, CAREFULLY TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL!

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

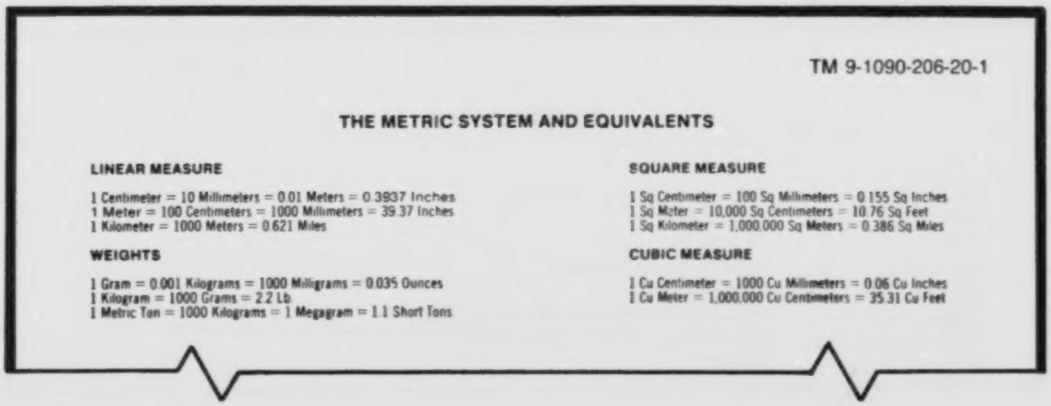
DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE

BE EXACT PIN-POINT WHERE IT IS

PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.	IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

DA FORM 2028-2 is used to recommend improvements or to report errors found in the manual.



TM 9-1090-206-20-1

THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
1 Kilometer = 1000 Meters = 0.621 Miles

WEIGHTS

1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
1 Kilogram = 1000 Grams = 2.2 Lb.
1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

SQUARE MEASURE

1 Sq Centimeter = 100 Sq Millimeters = 0.155 Sq Inches
1 Sq Meter = 10,000 Sq Centimeters = 10.76 Sq Feet
1 Sq Kilometer = 1,000,000 Sq Meters = 0.386 Sq Miles

CUBIC MEASURE

1 Cu Centimeter = 1000 Cu Millimeters = 0.06 Cu Inches
1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet

METRIC SYSTEM AND EQUIVALENTS provides information to convert between English and Metric equivalents.

USING YOUR MANUAL ON THE JOB

Like any tool, the best way to learn about this manual is to practice using it. Knowing how to use this manual will save both time and money.

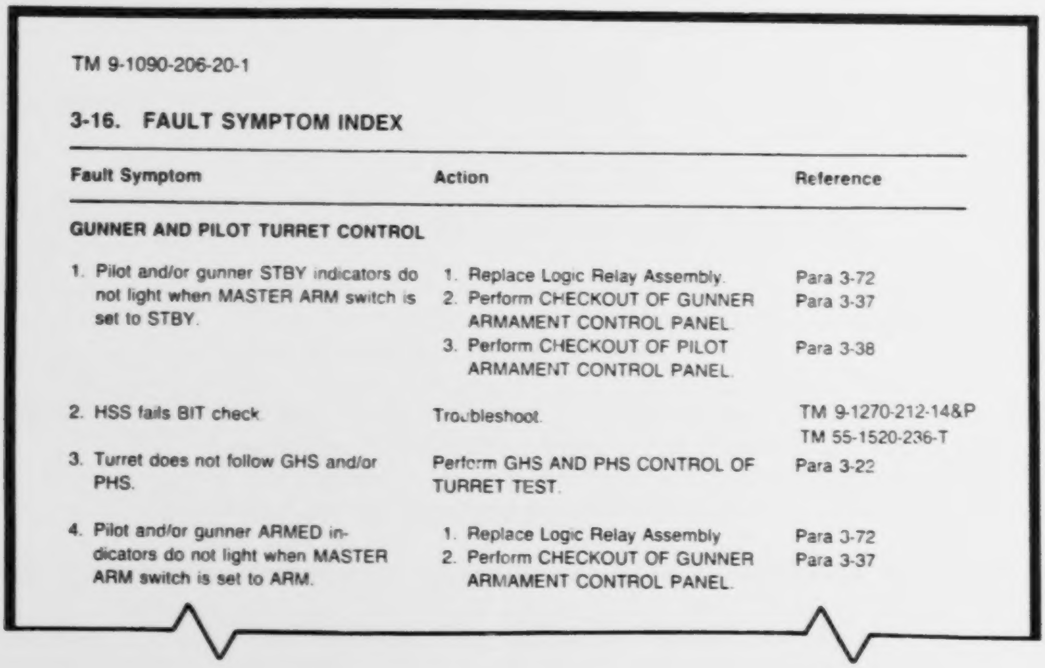
To help you find the information you need, each chapter and section of this manual begins with an index which lists the contents of the chapter and/or section by title and page/paragraph number.

Where do you start?

A malfunction is discovered in one of two ways: during normal operation; or during normal maintenance such as inspection, alinement, PMCS, or other scheduled testing. The symptoms of the malfunction may be common or unusual, but identification of fault symptoms is the first step in the troubleshooting process.

Entry into the troubleshooting process is based on observed fault symptoms. It is important that you identify the fault symptoms as accurately as possible and then use the Fault Symptom Index as an aid to identify the item that needs repair or replacement. If you feel confident that you have defined the fault symptoms as well as you can, you can refer directly to the Fault Symptom Index. You should be aware, however, that the more precise way to enter the Fault Symptom Index is to run the TURRET SUBSYSTEM PREOPERATIONAL CHECK.

The Fault Symptom Index describes the more common fault symptoms that you may encounter, specifies the actions to be taken, and references the places where these actions can be found.



TM 9-1090-206-20-1

3-16. FAULT SYMPTOM INDEX

Fault Symptom	Action	Reference
GUNNER AND PILOT TURRET CONTROL		
1. Pilot and/or gunner STBY indicators do not light when MASTER ARM switch is set to STBY.	1. Replace Logic Relay Assembly. 2. Perform CHECKOUT OF GUNNER ARMAMENT CONTROL PANEL. 3. Perform CHECKOUT OF PILOT ARMAMENT CONTROL PANEL.	Para 3-72 Para 3-37 Para 3-38
2. HSS fails BIT check.	Troubleshoot.	TM 9-1270-212-14&P TM 55-1520-236-T
3. Turret does not follow GHS and/or PHS.	Perform GHS AND PHS CONTROL OF TURRET TEST.	Para 3-22
4. Pilot and/or gunner ARMED indicators do not light when MASTER ARM switch is set to ARM.	1. Replace Logic Relay Assembly 2. Perform CHECKOUT OF GUNNER ARMAMENT CONTROL PANEL.	Para 3-72 Para 3-37

How do you fix the problem — A Quick Overview

1. Turn to the task referenced in the Fault Symptom Index and read it carefully before starting. Pay attention to warnings and cautions. Get the equipment, supplies, and any other personnel needed. If a task requires part replacement, refer to the Repair Parts and Special Tools List (RPSTL), TM 9-1090-206-23P.

2. Start with step 1 in the task and do each step in order. In some referenced tasks, one or more steps may have been completed. If so, proceed to the next step. When the last step is done, the problem will be corrected.

Finding A Task

Using another manual could result in reference to a task in this manual. For example, you were referenced to this manual to find the task REPAIR OF M197 GUN. To find where this task is located, refer to the Index at the back of this manual.

Using the INDEX

The Index lists each task under one or more headings. The task, REPAIR OF M197 GUN could be found:

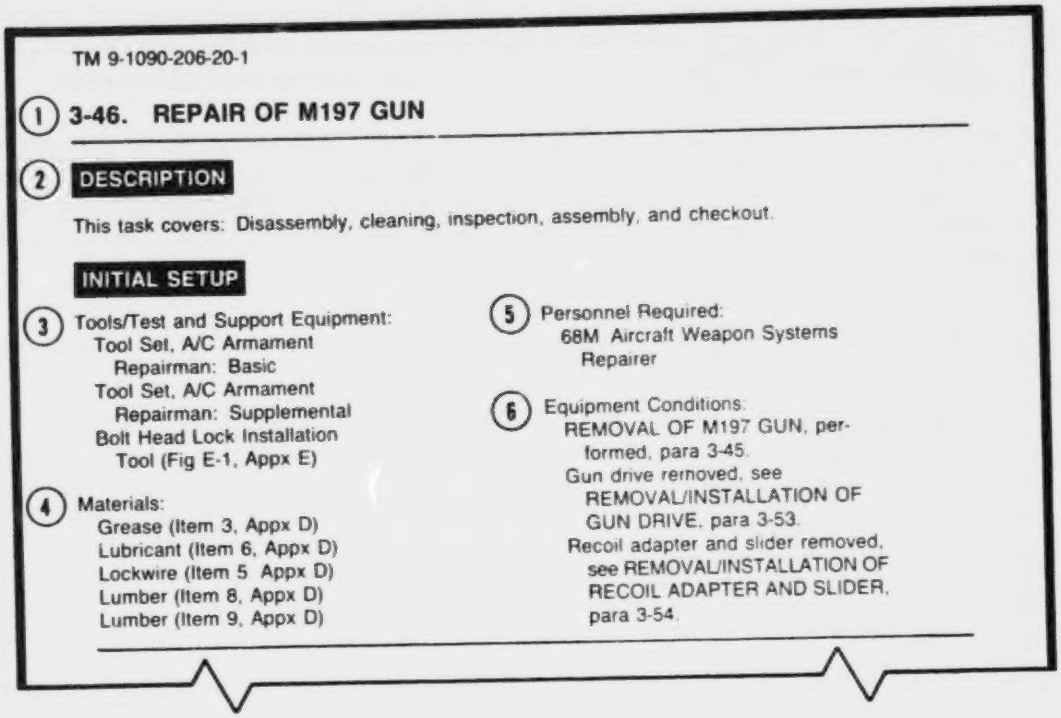
Under "M"
  M197 Gun — Repair, 3-46

Under "R"
  Repair of M197 Gun, 3-46

Turn to paragraph 3-46.

Beginning the Task

When you find paragraph 3-46, read the top half of the page. See the example below with its legend.



TM 9-1090-206-20-1

① **3-46. REPAIR OF M197 GUN**

② **DESCRIPTION**

This task covers: Disassembly, cleaning, inspection, assembly, and checkout.

INITIAL SETUP

③ Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental
  Bolt Head Lock Installation
    Tool (Fig E-1, Appx E)

④ Materials:
  Grease (Item 3, Appx D)
  Lubricant (Item 6, Appx D)
  Lockwire (Item 5, Appx D)
  Lumber (Item 8, Appx D)
  Lumber (Item 9, Appx D)

⑤ Personnel Required:
  68M Aircraft Weapon Systems
    Repairer

⑥ Equipment Conditions:
  REMOVAL OF M197 GUN, performed, para 3-45.
  Gun drive removed, see
    REMOVAL/INSTALLATION OF
    GUN DRIVE, para 3-53.
  Recoil adapter and slider removed,
    see REMOVAL/INSTALLATION OF
    RECOIL ADAPTER AND SLIDER,
    para 3-54.

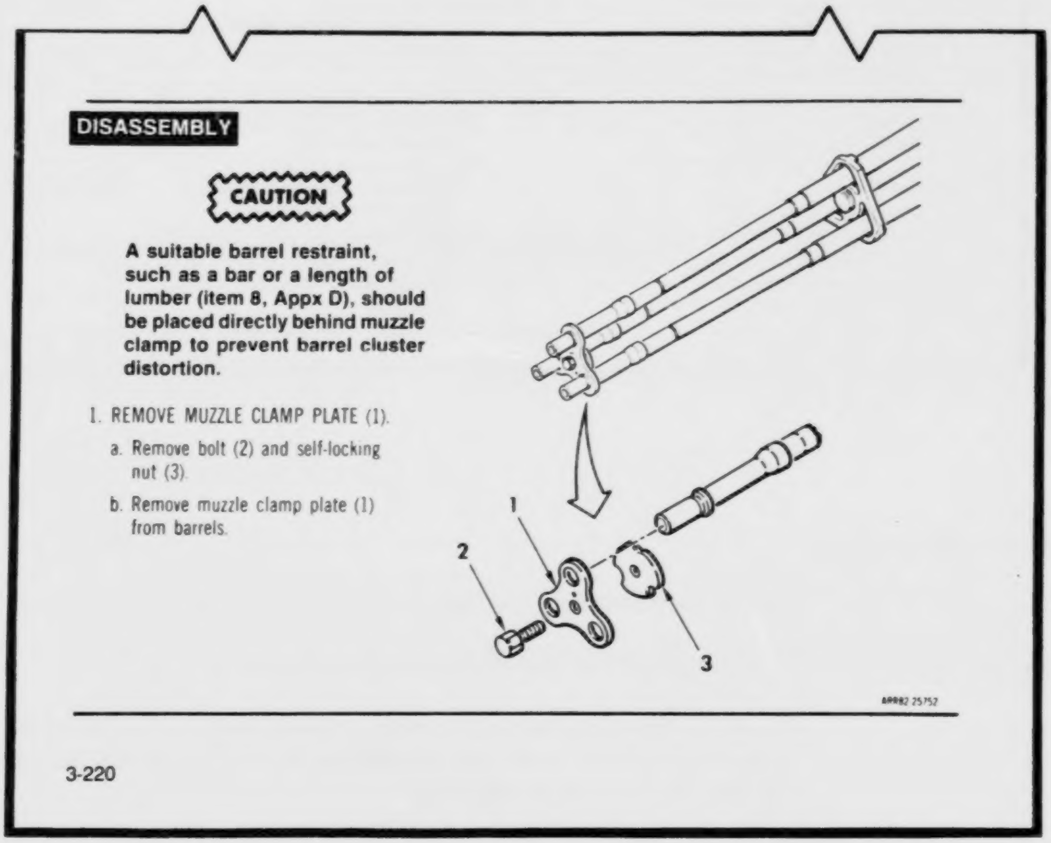
Legend to Example Above

1. Title	This is the paragraph number and name of the task.
2. Description	This describes the overall actions you will perform.
3. Tools	These are the tools and equipment you will need to complete the task. Tools found in the basic and supplemental A/C armament repairman tool sets are not listed separately.
4. Materials	These are the consumable materials you will need to do the task. Consumable materials are listed in the Expendable Supplies and Materials List (Appendix D). Use the Repair Parts and Special Tools List (RPSTL) to order the parts you need for the task.
5. Personnel Required	This tells you the personnel needed to perform the task.
6. Equipment Conditions	This describes the condition the equipment must be in before you start the task.

Using the Task Steps

Read through the task for step-by-step illustrated instructions. The numbered steps in capital letters tell WHAT to do; the lettered steps tell HOW to do it. If you are experienced, you may need to read only the numbered steps. If you are not experienced, you will want to read all the steps.

Below is the bottom half of the first page of the task, REPAIR OF M197 GUN. As you read step 1, match each numbered part in the instructions with the same number in the illustration. It is important to do each step in the order given. Note the boxed word, DISASSEMBLY, in the top left corner. It labels one of the major actions for this task. In this and other tasks, you could also see boxed words like CLEANING, INSPECTION, and ASSEMBLY.



DISASSEMBLY

CAUTION

A suitable barrel restraint, such as a bar or a length of lumber (item 8, Appx D), should be placed directly behind muzzle clamp to prevent barrel cluster distortion.

1. REMOVE MUZZLE CLAMP PLATE (1).
   a. Remove bolt (2) and self-locking nut (3).
   b. Remove muzzle clamp plate (1) from barrels.

3-220

DEFINITION OF TASK TERMS

Warnings, Cautions, and Notes

Pay attention to all warnings and cautions within the task. Ignoring a warning could cause death or injury to personnel. Ignoring a caution could cause damage to equipment. Notes contain facts to make the task easier. Both warnings and cautions always appear before the steps to which they apply.

WARNINGs: Call attention to conditions, practices, or procedures which could kill or injure personnel. Warnings are also listed in front of manual.

WARNING

The laminated shim has extremely sharp edges. Handle shim carefully to avoid injury.

CAUTIONs: Call attention to conditions, practices, or procedures which could damage equipment.

CAUTION

Washer must be positioned on side of arm nearest housing to prevent disengagement of linkage.

NOTEs: Contain essential information of special importance, interest, or aid in job performance to make the task easier.

NOTE

Newly installed bolt head locks may appear distorted or loose. This condition is normal.

References

References within a task refer to another task in the same manual. A step in one task may be a complete task somewhere else. Below is an example of a reference step from the task, CHECKOUT OF TURRET CONTROL UNIT.

Example:

8. REMOVE POWER. SEE ELECTRICAL
   POWER APPLICATION/REMOVAL,
   PARA 2-7.

The tools needed to do the referenced task will be listed in that task.

Cleaning and Inspection

Clean and inspect steps for every task are found in Chapter 3, Section IV, GENERAL MAINTENANCE INSTRUCTIONS. Use these steps to clean and inspect any part being removed, repaired, or installed. Special cleaning will be covered in the task step. Below is a step that requires general cleaning.

Example:

3. PERFORM GENERAL CLEANING
   PROCEDURES IN ACCORDANCE WITH
   CHAPTER 3.

Kinds of Tasks

"Removal/Installation ."
Tasks which remove components and install components. They can be used as tasks which provide access to components or as tasks which replace defective components.

"Repair ."
Tasks which disassemble, clean, inspect, repair, and assemble components.

" Test"
Tasks which test the functions of the armament subsystem for proper operation.

"Checkout ."
Tasks which check components for proper operation.

COMMENTS ON TASKS.

The following comments apply to all tasks.

1. Consumable materials are listed under materials.
2. Removed components must be cleaned, inspected, and reinstalled if found to be serviceable.
3. Cleaning and inspection must be done according to general maintenance instructions.
4. A new component must be installed if inspection indicates a removed component is defective.
5. Defective components must be discarded or sent to the next higher maintenance level.

CHAPTER 1

INTRODUCTION

CHAPTER CONTENTS

		Page
Section I	General Information	1-1
Section II	Equipment Description and Data	1-5
Section III	Principles of Operation	1-54

Section I. GENERAL INFORMATION

Section Contents	Para
Scope	1-1
Maintenance Forms, Records, and Reports	1-2
Destruction of Army Materiel to Prevent Enemy Use	1-3
Preparation for Storage or Shipment	1-4
Quality Assurance/Quality Control (QA/QC)	1-5
Nomenclature Cross Reference List	1-6
Reporting Equipment Improvement Recommendations (EIR)	1-7

SCOPE

1-1. This manual is for your use in performing aviation unit maintenance of the 20-mm Automatic Gun Helicopter Armament Subsystem M97A2 .

MAINTENANCE FORMS, RECORDS, AND REPORTS

1-2. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-751, Functional Users Manual for the Army Maintenance Management Systems - Aviation (TAMMS-A)

DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

1-3. Refer to TM 750-244-1-5 for instructions pertaining to destruction of army materiel to prevent enemy use.

PREPARATION FOR STORAGE OR SHIPMENT

1-4. Preservation, packaging, and preparation for storage will be in accordance with TM 740-90-1 and the local directives of the commands concerned.

QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

1-5. Information not available.

NOMENCLATURE CROSS REFERENCE LIST

1-6. A cross reference of the official and common names of the components of the 20-mm Automatic Gun Helicopter Armament Subsystem M97A2 is shown below. Common names will be used throughout this manual.

Common Name	Official Name
Actuator	Actuator Cam
Adjusting Plate	Adjusting Access Cover
Airspeed Transducer	Motion Transducer
Armament Subsystem	20-mm Automatic Gun Helicopter Armament Subsystem M97A2
Azimuth Clutch	Adjusting Block
Azimuth Drive	Rotary Electro-Mechanical Actuator
Azimuth Drive Motor	Direct Current Motor
Azimuth Proximity Switch	Azimuth Switch Assembly
Azimuth Resolver	Electrical Resolver
Azimuth Stow Switch	Rotary Switch
Azimuth Tachometer	Tachometer Generator
Bearing Retainer	Bearing Retainer Assembly
Booster Motor	Direct Current Motor
Cam Link Bracket	Support Bracket Assembly
Elevation Clutch	Positive Clutch
Elevation Drive Motor	Direct Current Motor

Common Name	Official Name
Elevation Proximity Switch	Elevation Switch Assembly
Elevation Stow Switch	Turret Switch
End Plate	End Plate Assembly
Feed Chute	Ammunition Chute
Fire Control Computer	Digital Fire Control Computer M26
Firing Contact	Firing Contact Assembly
Firing Pin Spring	Breech Assembly Spring
Gun Control Unit	Gun Control Assembly
Gun Drive	Rotary Electro-Mechanical Actuator
Gun Drive Motor	Direct Current Motor
Gunner Armament Control Panel	Gunner Armament Control Panel
Head Up Display Subsystem	Head Up Display Subsystem Helicopter Sight M76
Helmet Sight Subsystem	Helmet-Directed Fire Control Subsystem M136
Interface Control Unit	Interface Control Unit Assembly
Lanyard	Single Leg Wire Rope Assembly
Locking Block	Machine Breech Lock
M197 Gun	20-mm Three Barrel High Rate Automatic Gun M197
M89E1 Feeder	Automatic Gun Feeder Assembly M89E1
Pilot Armament Control Panel	Pilot Armament Control Assembly
Rear Support	Rear Support Assembly
Recoil Adapter	Linear Actuating Recoil Adapter
Rocket Management Subsystem	Rocket Management Subsystem M147

Common Name	Official Name
Rotor	Rotor Assembly
Rotor Housing	Rotor Housing Subassembly
Rounds Totalizer	Electrical Counter
Rubber Stop	Mounting Stop
Saddle	Weapon Saddle
Shim	Plain Solid Disk
Shim	Ring Spacer
Slider	Linear Actuating Slide Assembly
Tachometer	Tachometer Generator
Turret	Turret Assembly
Turret Buffer Amplifier	Turret Buffer Amplifier Assembly
Turret Control Unit	Turret Control Assembly
Upper Support	Matched Support Assembly

REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

1-7. If your armament subsystem needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Put it on an SF368 (Quality Deficiency Report). Mail it to us at Commander, U.S. Army Armament, Munitions and Chemical Command, ATTN: AMSMC-QAD, Rock Island, IL 61299-6000. We'll send you a reply. Instructions for preparing EIRs are provided in DA PAM 738-751.

CORROSION PREVENTION AND CONTROL (CPC)

1-7.1. It is important that any corrosion problems with items contained in this technical manual be reported so that the problem can be corrected and improvements can be made to prevent the problem in the future.

While corrosion is typically associated with rusting of metals, it can also include deterioration of other materials such as rubber and plastic. Unusual cracking, softening, swelling, or breaking of these materials may be a corrosion problem.

If a corrosion problem is identified, it can be reported using SF368, Quality Deficiency Report. The form should be submitted to: Commander, U.S. Army Armament, Munitions and Chemical Command, ATTN: AMSMC-QAD/Customer Feedback Center, Rock Island, IL 61299-6000. Use of key words such as corrosion, rust, deterioration, or cracking will assure that the information is identified as a CPC problem.

Section II. EQUIPMENT DESCRIPTION AND DATA

Section Contents	Para
Equipment Characteristics, Capabilities, and Features	1-8
Location and Description of Major Components	1-9
Differences Between Models	1-10
Equipment Data	1-11
Safety, Care, and Handling	1-12

EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES

1-8. The characteristics, capabilities, and features of each subsystem of the armament subsystem are listed below.

ROCKET MANAGEMENT SUBSYSTEM (RMS)

Wing-Mounted
Electrically Powered
Pilot Controlled
Selective Use of Mixed Rocket Inventory
Remote Set of Rocket Fuzes
Choice of Launch Mode, Rate, and Number of Rockets
Continuous Display of Rockets Remaining by Type and Zone Location

HELMET SIGHT SUBSYSTEM (HSS)

Pilot/Gunner Direction of Turret Subsystem Weapon Fire
Pilot/Gunner Direction of Telescopic Sight Unit for Rapid Acquisition of a Missile Target

HEAD UP DISPLAY SUBSYSTEM (HUD)

Pilot Direction of Helicopter for Rocket and Fixed-Forward Weapon Fire
Provides Head Up Display of TOW Prelaunch and Postlaunch Constraints, and Direct and Indirect Rocket Aim Points
Provides Head Up Safety of Flight Display of Engine Torque, Airspeed, Attitude, Magnetic Heading, and Range

FIRE CONTROL COMPUTER (FCC)

Optimizes Characteristics of Each Subsystem for Maximum Effectiveness
Provides Rocket and M197 Gun Fire Control Solutions for Projectile Ballistics, Aircraft Motion, Air Data, Range, and Target Motion

AIR DATA SUBSYSTEM (ADS)

Air Data Input to Fire Control Computer
Provides Pilot Display of Low Airspeed in Forward, Rearward, and Sideways Flight

TURRET SUBSYSTEM

Chin-Mounted
Electrically Powered
Pilot/Gunner Controlled
Provides Suppressive Fire Against Point and Area Targets
Accepts 7.62-mm M134 Gun, 20-mm M197 Gun, or 30-mm XM230E1 Cannon (current application limited to 20-mm configuration)
Automatic Burst Limit or Optional Fire-Out
Interlocks Prevent Projectile Interaction During Combined Firing of Missiles, Rockets, and M197 Gun

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

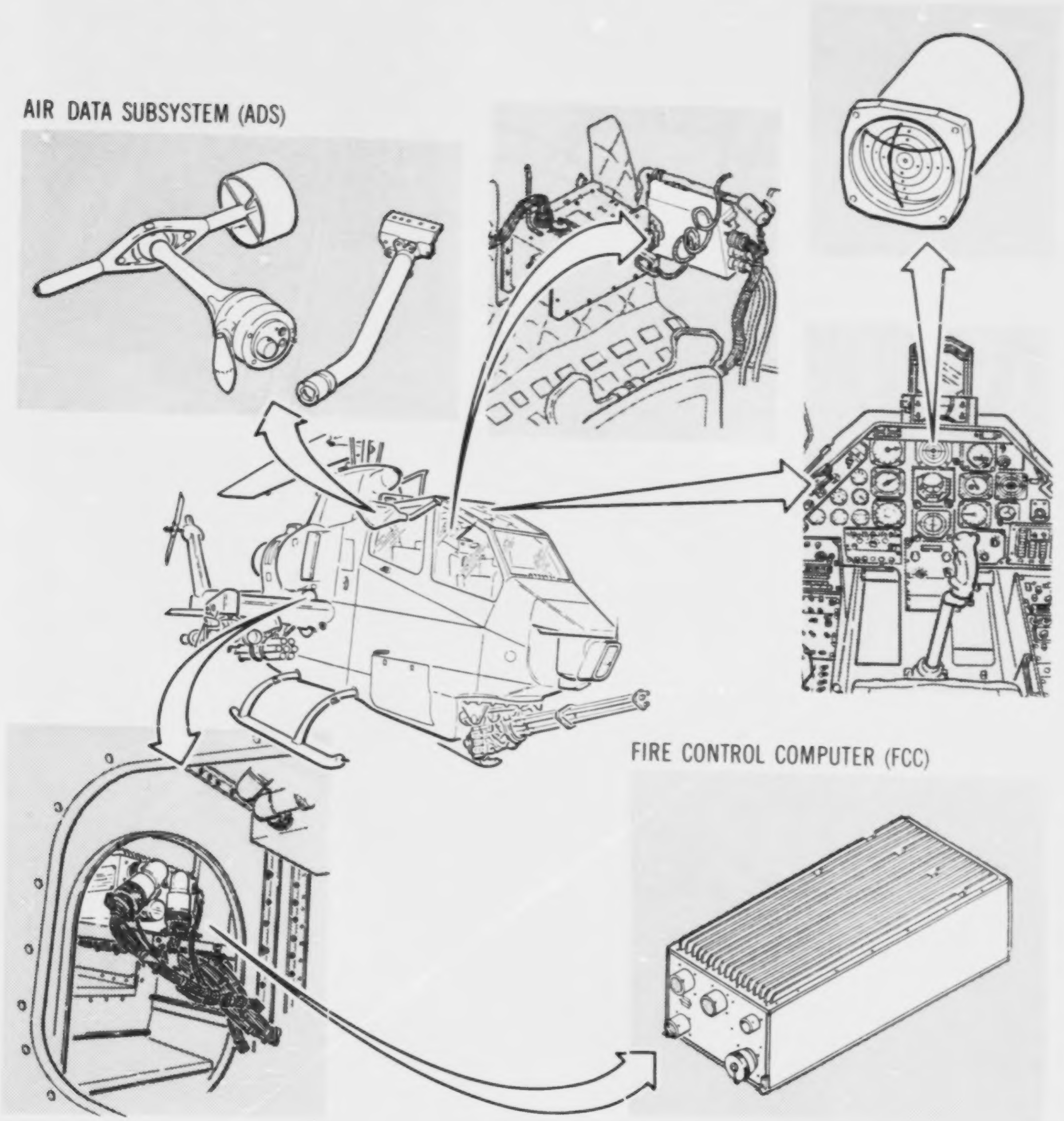
1-9. The armament subsystem provides a mix of point and area target weapons. Each munition is used against the target it is best suited to engage. The integrated fire control makes maximum effective use of each type of ordnance carried. The RMS provides pilot selectivity in use of a mixed rocket inventory. The pilot can choose the best warhead for attack and can choose the number of rockets and launch mode (singles, pairs, multiple pairs). The pilot can remote set fuzes (penetration delay or time of function, i.e., range for sub-munitions) prior to attack. During the mission, the display indicates the number of rounds remaining by type and number. The pilot can manually enter range to target or can use range as provided by the laser rangefinder and updated by the FCC.

In conjunction with the HUD and computer-driven rocket firing reticles, accurate fire (direct and indirect to 6000 meters) is achievable. Indirect fire is equally achievable day or night as long as the gunner can observe the target with night vision goggles or external illumination.

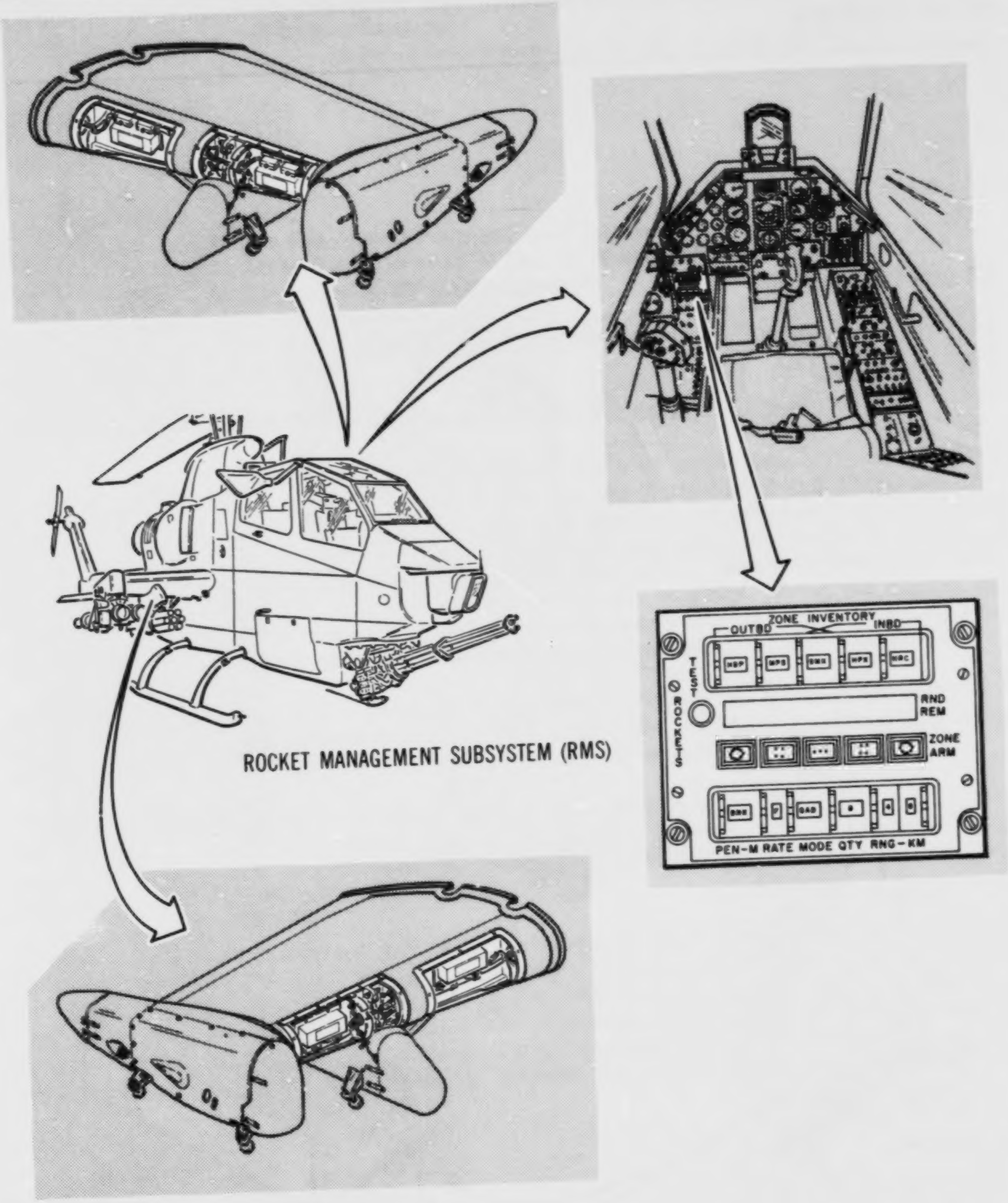
The turret subsystem provides accurate suppressive fire capability against point and area targets. Provides flexible operation with helmet sight direction by pilot or gunner and precision tracking by gunner using the telescopic sight unit (TSU) of the M65 TOW Guided Missile System. Provides automatic burst limit or optional fire-out capability.

The FCC optimizes the characteristics of each subsystem for maximum effectiveness. Fire control solutions for rockets and M197 gun include: projectile ballistics, aircraft motion, air data, range, and target motion. System control and logic is designed for rapid simple operation in nap-of-the-earth (NOE) environment. The HUD displays TOW envelopes, direct and indirect rocket aim points, airspeed, altitude, heading, and range. The TSU displays weapon status and range. Momentary fire interlocks prevent projectile interaction during combined firing of missiles, rockets, and M197 gun.

The armament subsystem consists of the following major components which are shown mounted in the AH-1F helicopter.

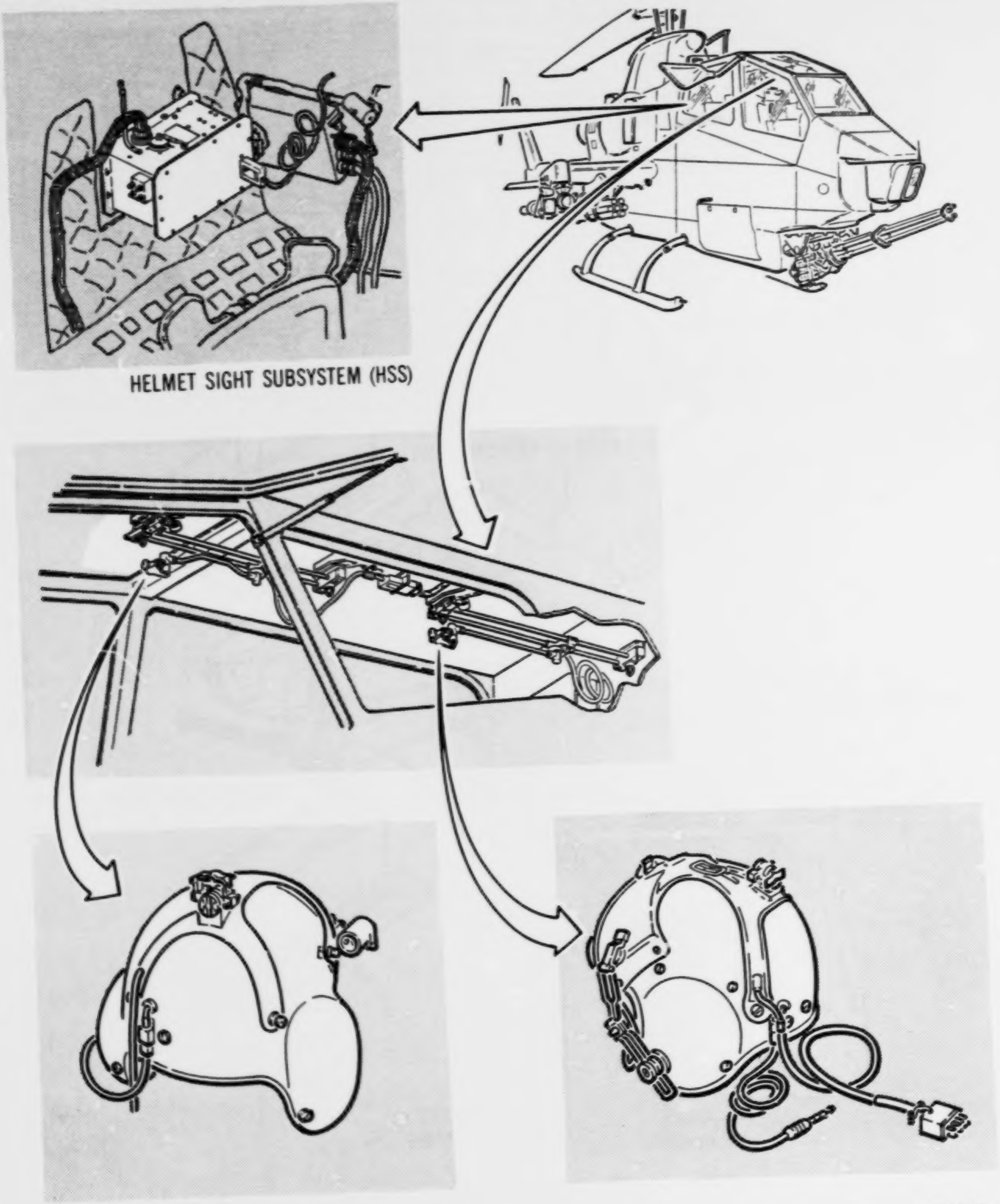

AIR DATA SUBSYSTEM (ADS)
FIRE CONTROL COMPUTER (FCC)

ARR82-27847

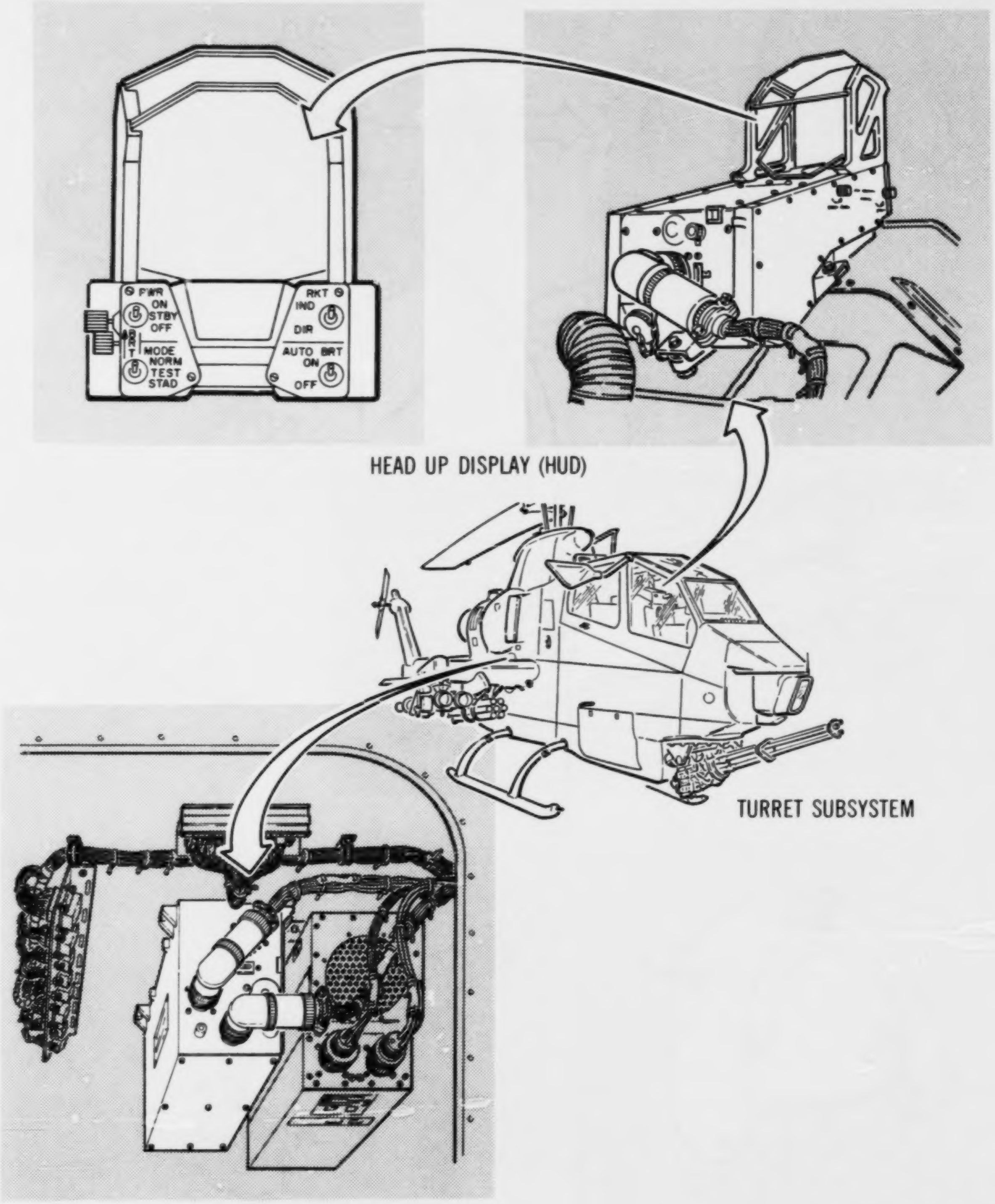

ZONE INVENTORY
OUTBD
INBD
TEST
ROCKETS
RND REM
ZONE ARM
PEN-M RATE MODE QTY RNG-KM

ROCKET MANAGEMENT SUBSYSTEM (RMS)

ARR82-27848


HELMET SIGHT SUBSYSTEM (HSS)

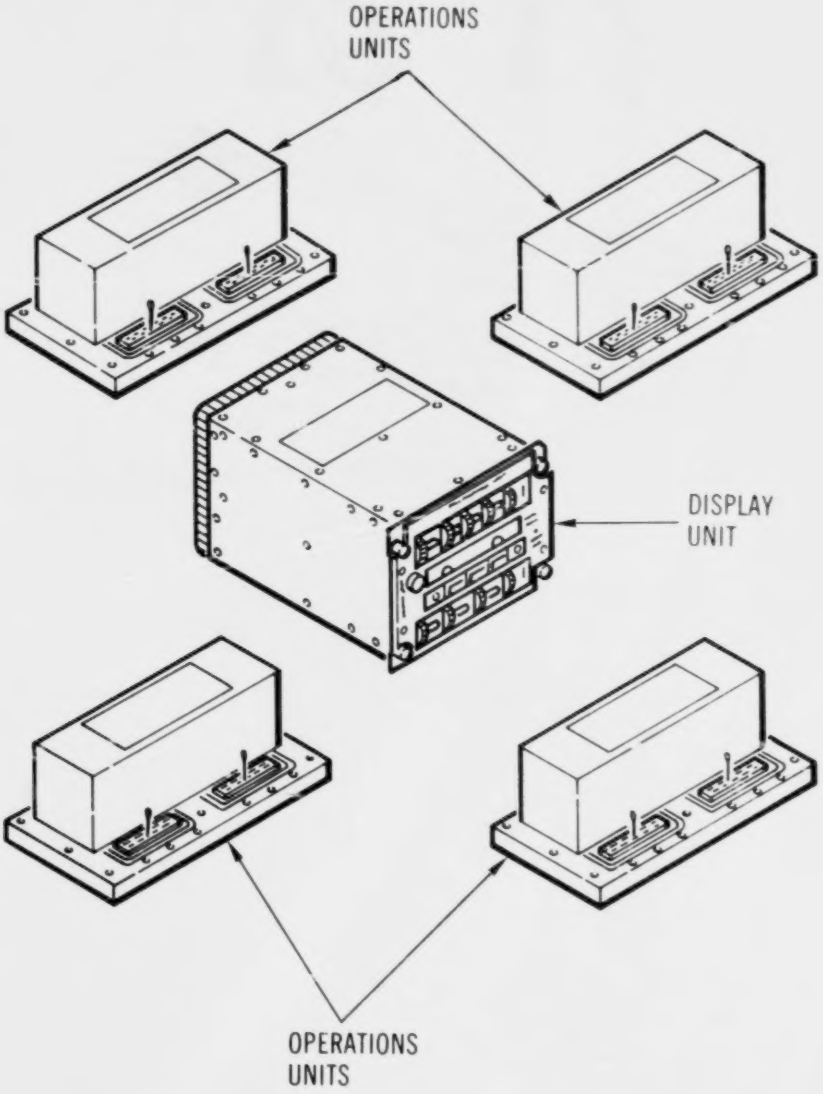
ARR82-27849


PWR
ON
STBY
OFF
BRT
MODE
NORM
TEST
STAD
RKT
IND
DIR
AUTO BRT
ON
OFF
HEAD UP DISPLAY (HUD)
TURRET SUBSYSTEM

ARR82-27850

ROCKET MANAGEMENT SUBSYSTEM

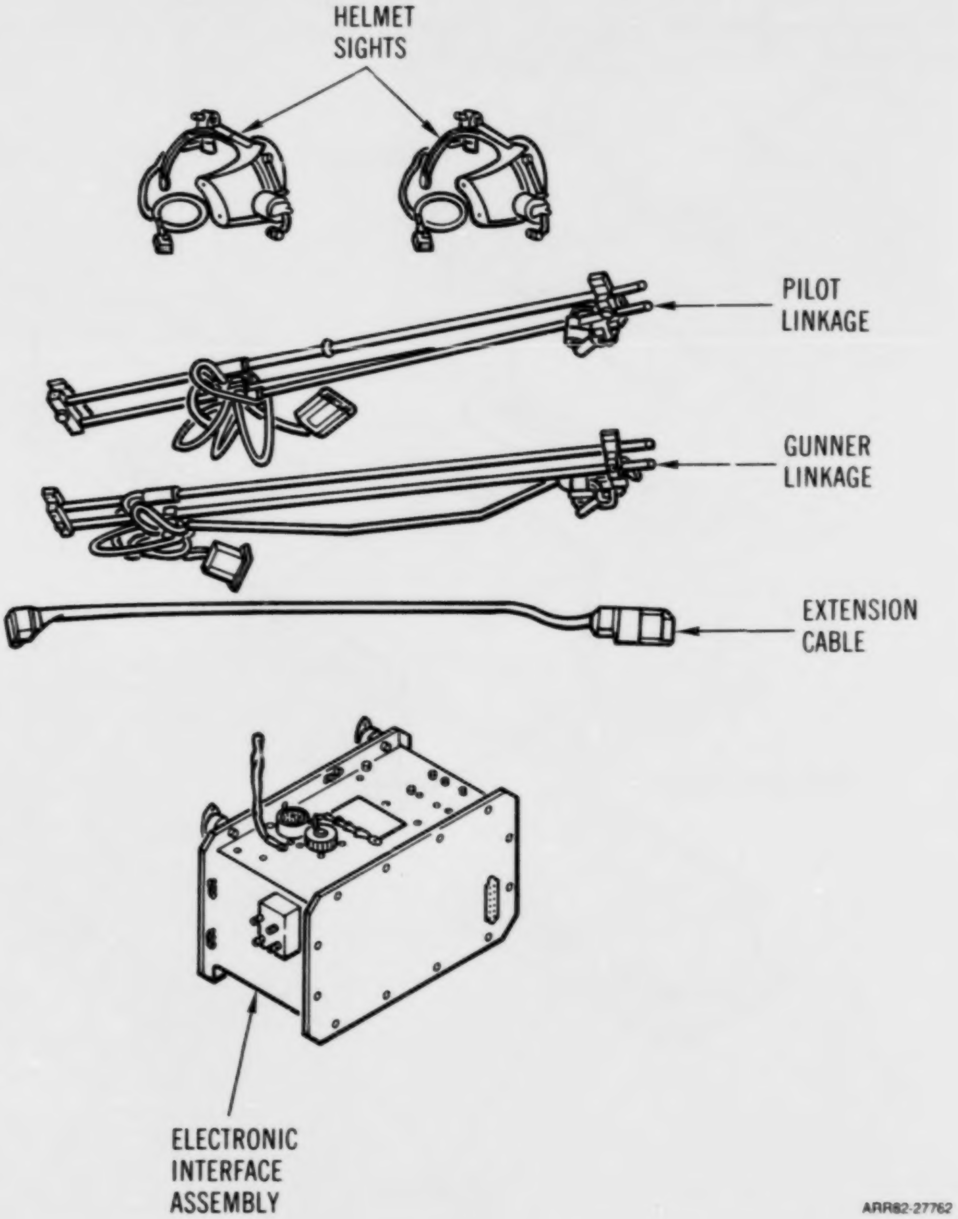
Consists of a display unit, four operations units (one at each wing stores station; current Army configuration utilizes two operations units on inboard stations), interconnecting electrical components, and rocket launchers. The RMS uses 2.75-inch folding fin aerial rockets (FFAR) with MK40/MK66 rocket motors as a light anti-personnel/assault weapon. The rocket control and display unit permits the pilot to select the launcher zone containing the desired type of rocket and set the warhead fuze. The pilot can program the launcher for rate, mode, and quantity of rockets to be fired. The rocket control and display unit provides a continuous display of rockets remaining by type and zone location. Refer to TM 9-1090-207-13&P for additional information pertaining to RMS components.



ARR82-27768

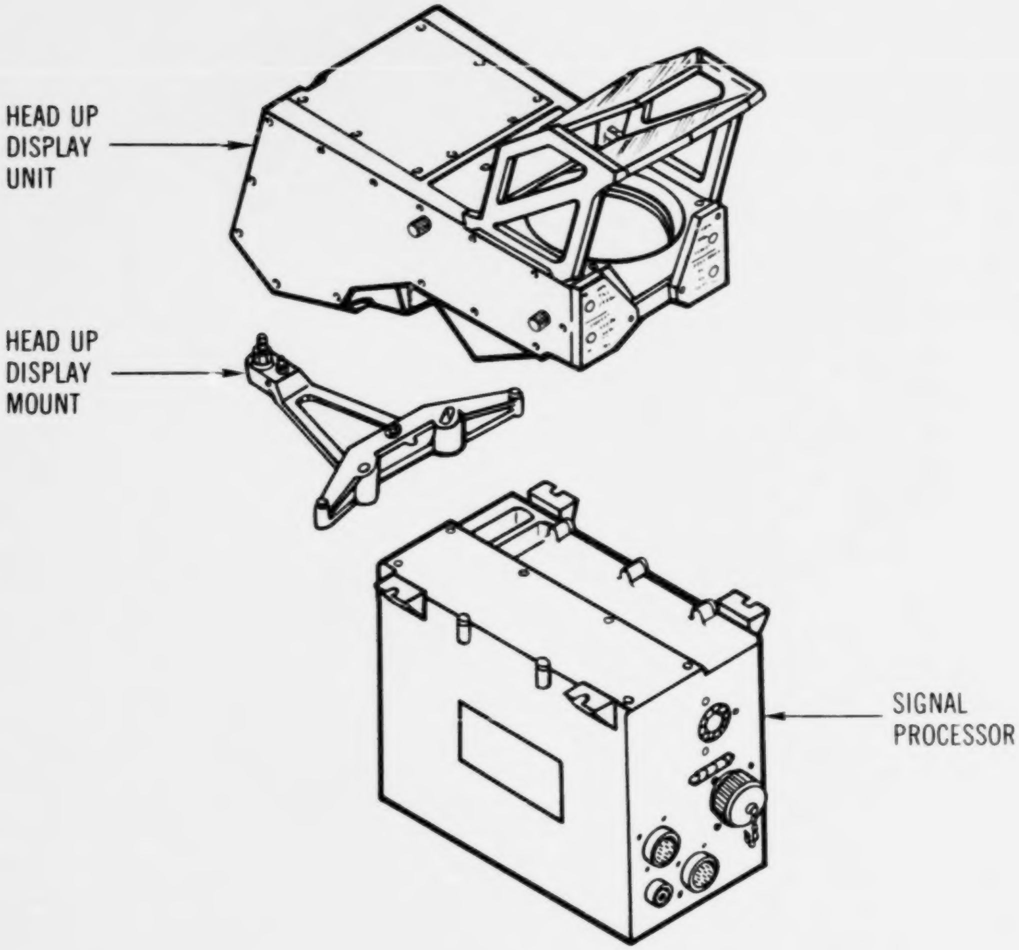
HELMET SIGHT SUBSYSTEM

Consists of the pilot and gunner helmet sights, pilot and gunner linkage, extension cable, and the electronic interface assembly. The HSS provides the pilot and gunner with the capability to rapidly acquire visible targets and to direct either the TSU or the turret to those targets. Refer to TM 9-1270-212-14&P for additional information pertaining to HSS components.


HELMET SIGHTS
PILOT LINKAGE
GUNNER LINKAGE
EXTENSION CABLE
ELECTRONIC INTERFACE ASSEMBLY
ARR82-27762

HEAD UP DISPLAY SUBSYSTEM

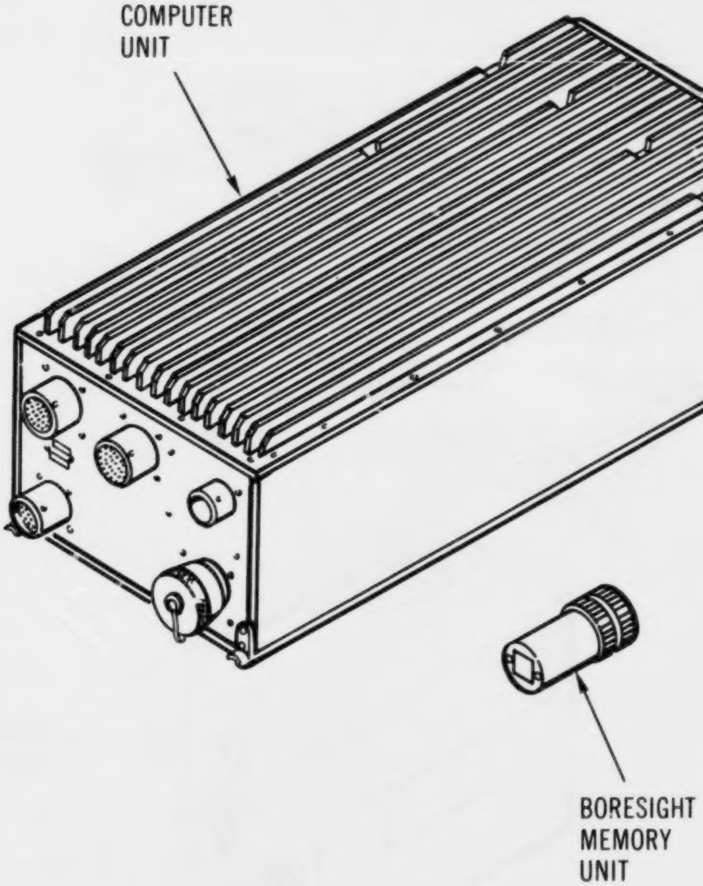
Consists of a head up display unit, signal processor, and the head up display mount. The HUD permits the pilot to aim the helicopter for rocket and fixed forward gun firing. The HUD provides the pilot with a head up display of TOW missile prelaunch and postlaunch flight constraints, direct and indirect rocket aim points, engine torque, airspeed, altitude, magnetic heading, and range. The fire control and flight data is displayed as numbers and symbols on the head up display unit optical image combiner. The head up display unit is mounted on and above the pilot instrument panel so that the dual combiner is in the pilot's forward field of view. The transparent dual combiner permits the pilot to view the target and the displayed symbology simultaneously. Refer to TM 9-1270-220-13&P for additional information pertaining to HUD components.



ARR82-27763

FIRE CONTROL COMPUTER

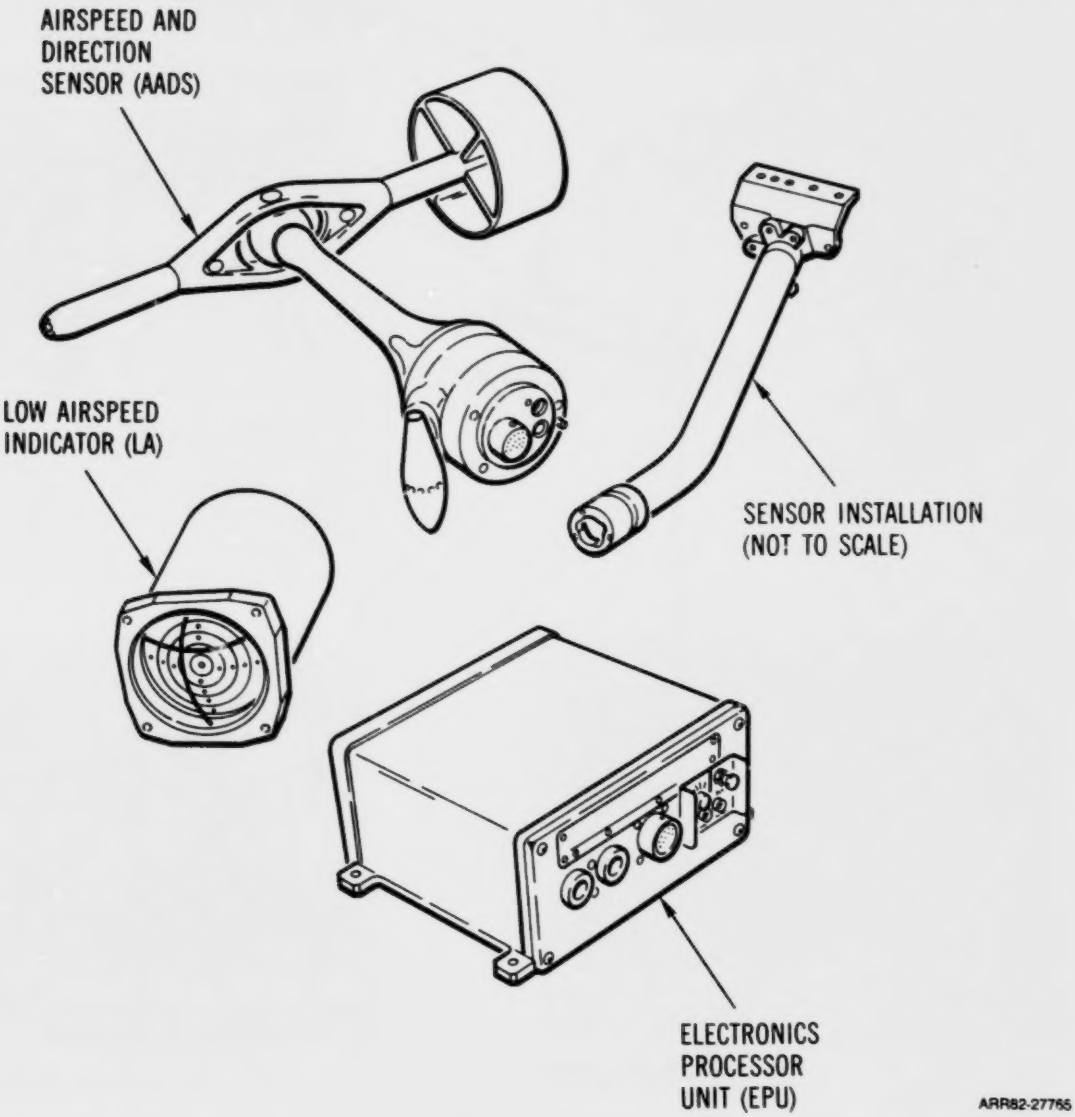
Consists of the computer unit and the boresight memory unit. The FCC provides ballistic computations and directional correction commands for rocket, powered by MK40/MK66 rocket motors, or gun firing to compensate for aircraft motion, air data, range, projectile ballistics, and target motion. The FCC also provides boresight compensation, data for HUD symbology, and outputs to enhance the functions of the doppler navigation set. Refer to TM 9-1270-218-13&P for additional information pertaining to FCC components.



ARR82-27764

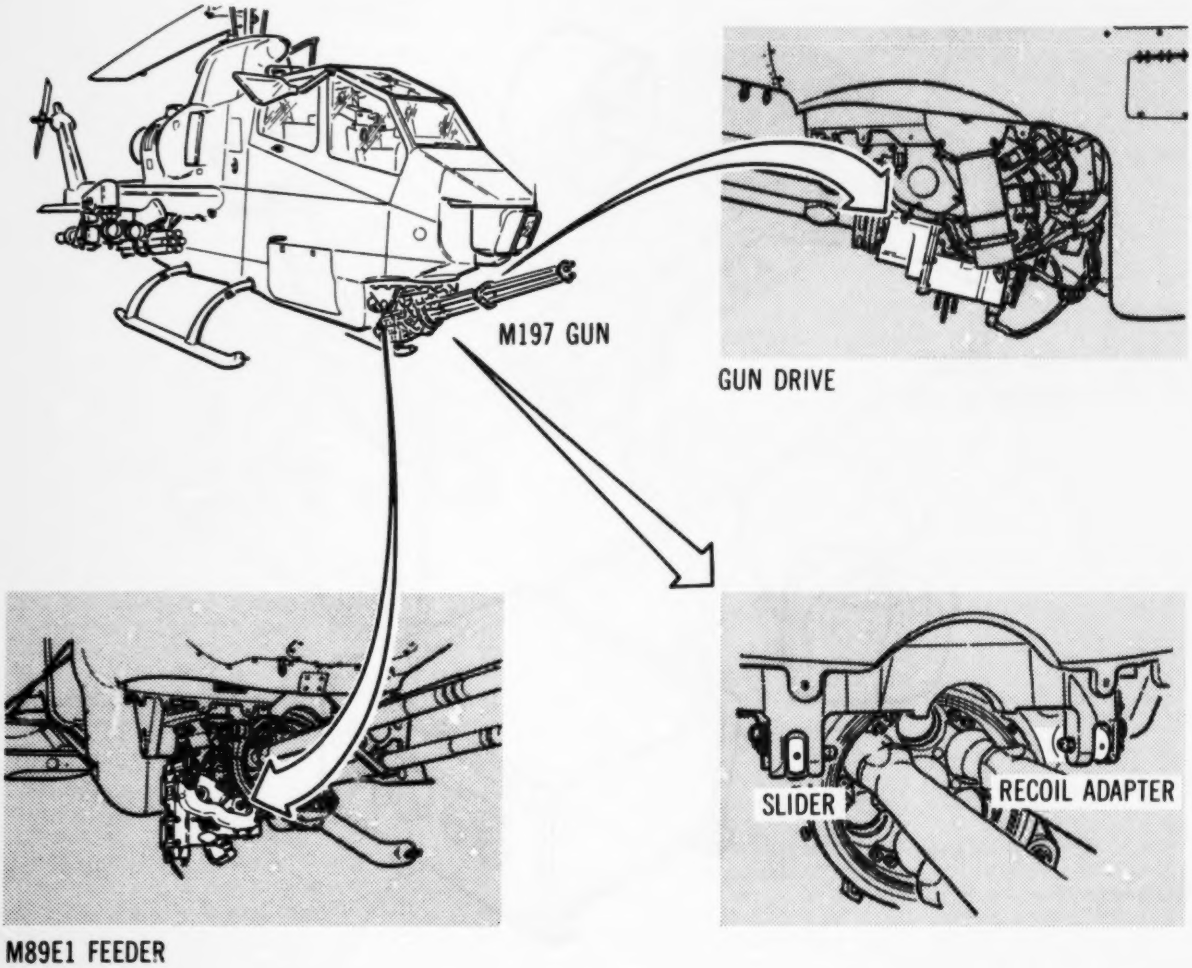
AIR DATA SUBSYSTEM

Consists of the airspeed and direction sensor, electronics processor unit, and the low airspeed indicator. However, the sensor installation is usually considered part of the air data subsystem. The ADS supplies true airspeed, absolute (static) pressure, and free-stream air temperature signals to the FCC. An altitude signal is fed to the ADS from the radar altimeter to provide ground effect error correction. The low airspeed indicator provides the pilot with a display of horizontal airspeed, up to 50 knots, in forward, rearward, and sideways flight. Refer to TM 9-1270-219-13&P for additional information pertaining to ADS components.

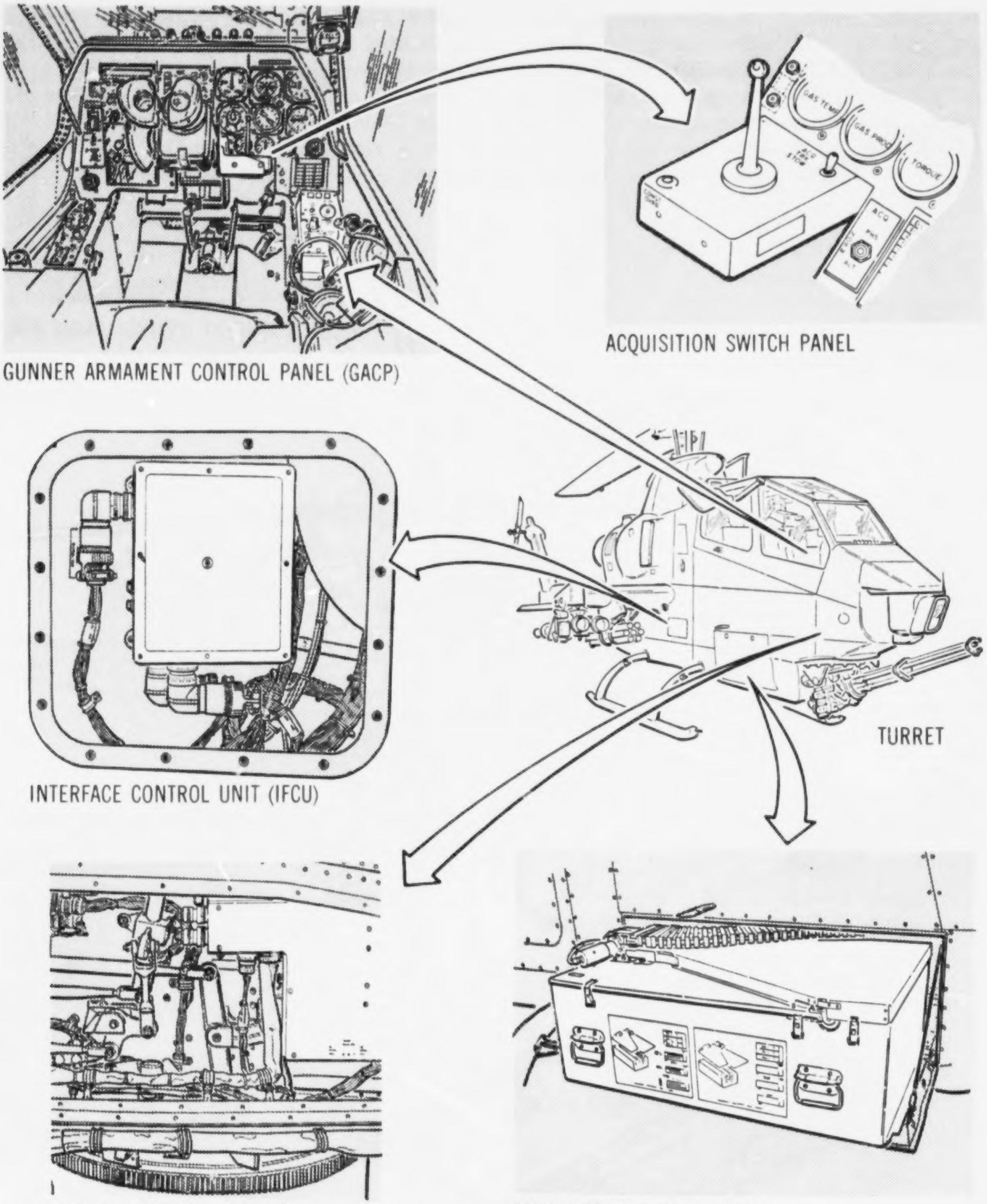

AIRSPEED AND
DIRECTION
SENSOR (AADS)
LOW AIRSPEED
INDICATOR (LA)
SENSOR INSTALLATION
(NOT TO SCALE)
ELECTRONICS
PROCESSOR
UNIT (EPU)
ARR82-27765

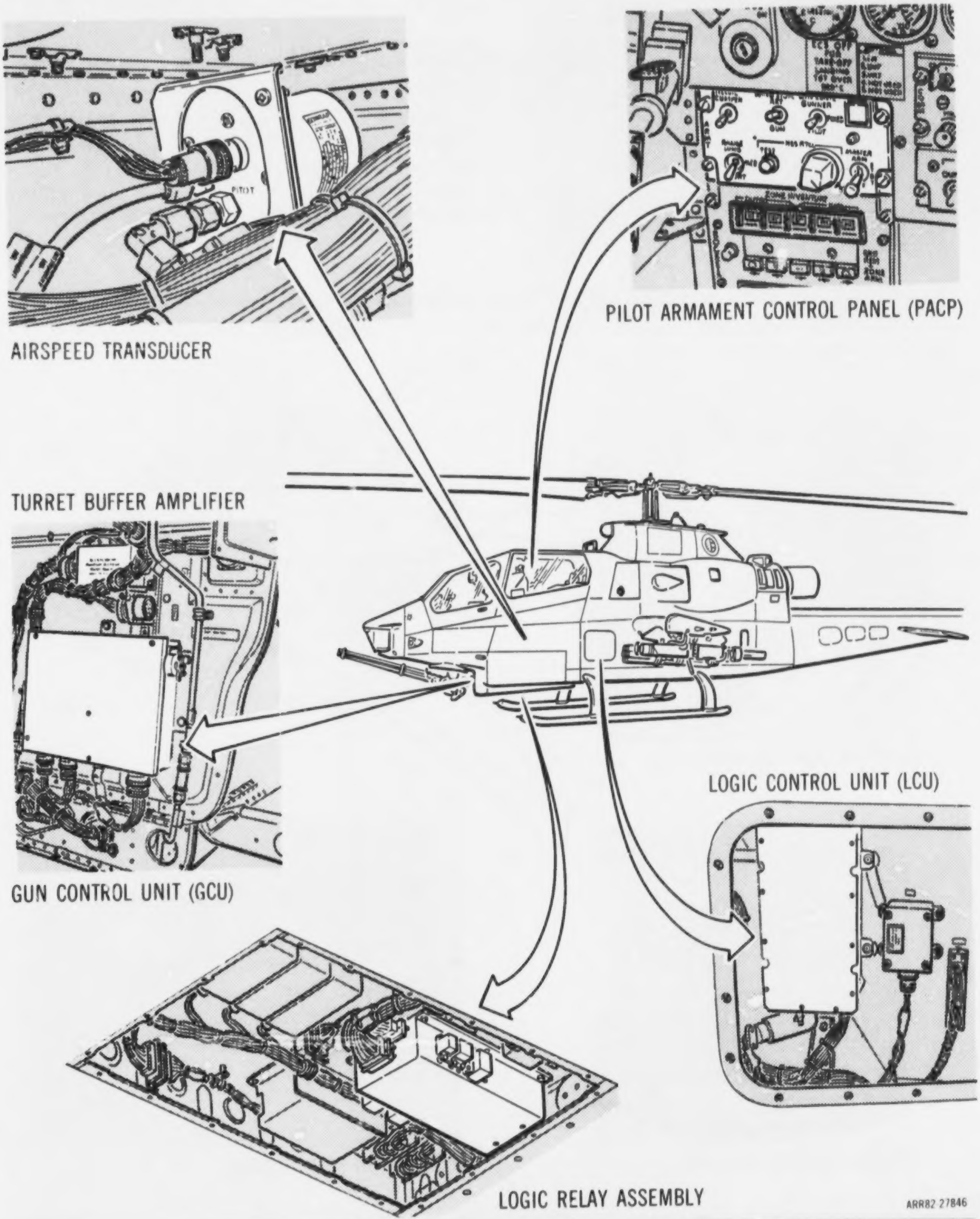
TURRET SUBSYSTEM

Chin-mounted on the AH-1F helicopter. Provides suppressive fire armament with either the 7.62-mm M134 Machine Gun, 20-mm M197 Automatic Gun, or the 30-mm XM230E1 Cannon; however, current application is limited to 20-mm configuration. The electrically powered turret is flexible in azimuth and elevation and is aimed at selected targets by pilot and gunner using HSS; by pilot using HUD; or by gunner using TSU. Ammunition is supplied from a single container located directly behind the turret and below the crew compartment. Two doors, one on each side, provide access to the ammunition bay. The turret subsystem consists of the following major components which are shown mounted in the AH-1F helicopter.



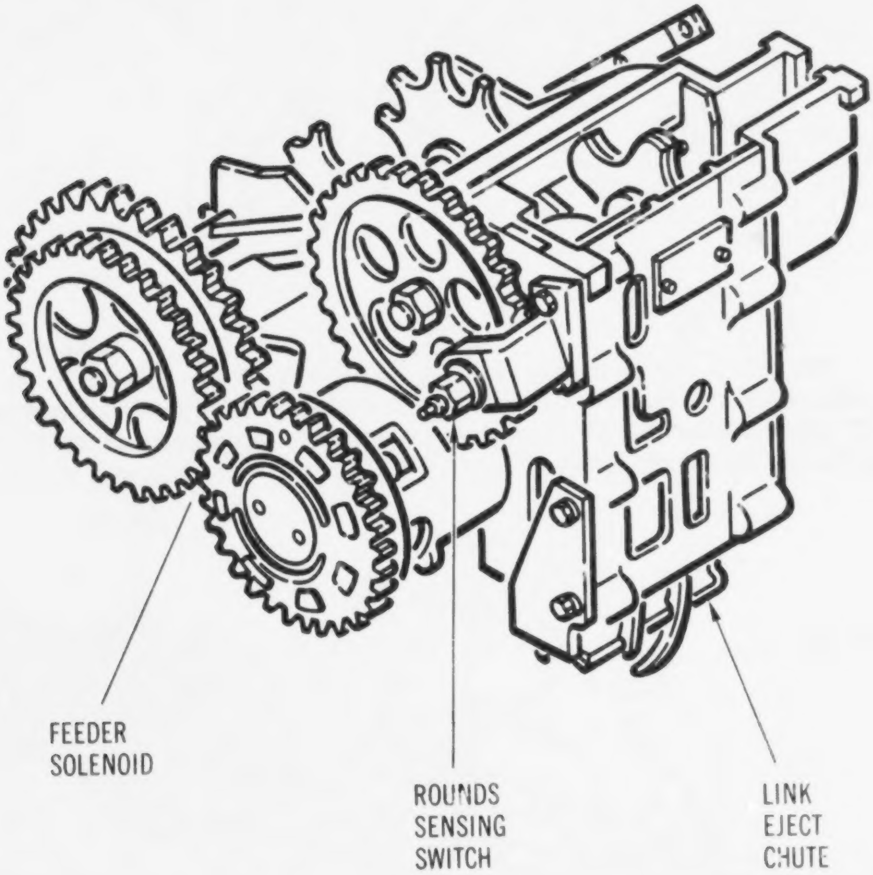
ARR82-27766A


GUNNER ARMAMENT CONTROL PANEL (GACP)
ACQUISITION SWITCH PANEL
GAS TEMP
GAS PROD
TORQUE
ACQ
INTERFACE CONTROL UNIT (IFCU)
TURRET
TURRET CONTROL UNIT (TCU)
AMMUNITION FEED SYSTEM
ARR82-27845


AIRSPEED TRANSDUCER
PILOT ARMAMENT CONTROL PANEL (PACP)
TURRET BUFFER AMPLIFIER
GUN CONTROL UNIT (GCU)
LOGIC CONTROL UNIT (LCU)
LOGIC RELAY ASSEMBLY
ARR82 27846

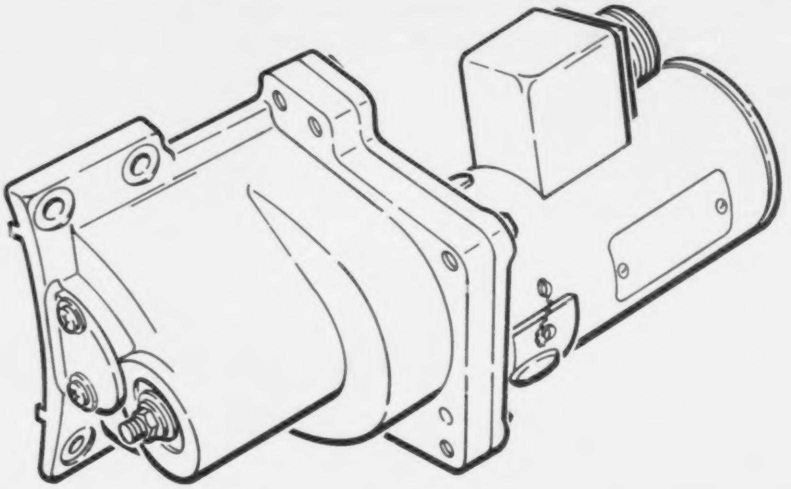
M89E1 FEEDER

Mounted on and geared to the M197 gun. A solenoid-operated declutching mechanism controls the operation of the M89E1 feeder. The forward and aft housings contain round and link handling sprockets and guides. The stripper sprocket and link stripper strip rounds from the ammunition belt. The accelerator sprocket transfers rounds from the stripper sprocket to the feeder sprocket. The feeder sprocket feeds rounds into the M197 gun. The link eject chute directs empty links clear of the helicopter. The rounds sensing switch provides electrical counting pulses to the RD RMNG indicator on the gunner armament control panel and to the rounds totalizer on the turret.



GUN DRIVE

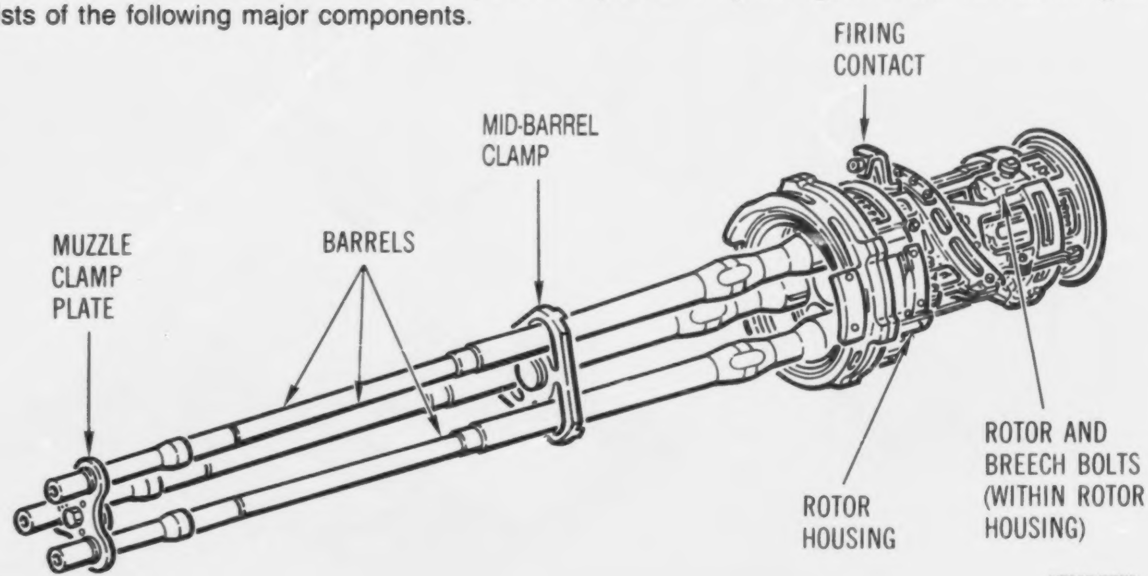
Mounted on and geared to the M197 gun. Consists of a gearbox and a gun drive motor. The gearbox encloses a gear train which transmits power from the dc motor to the M197 gun. The output cluster gear is pinned together with two shear pins to protect drive train components from excessive damage.



ARR82-27761

M197 GUN

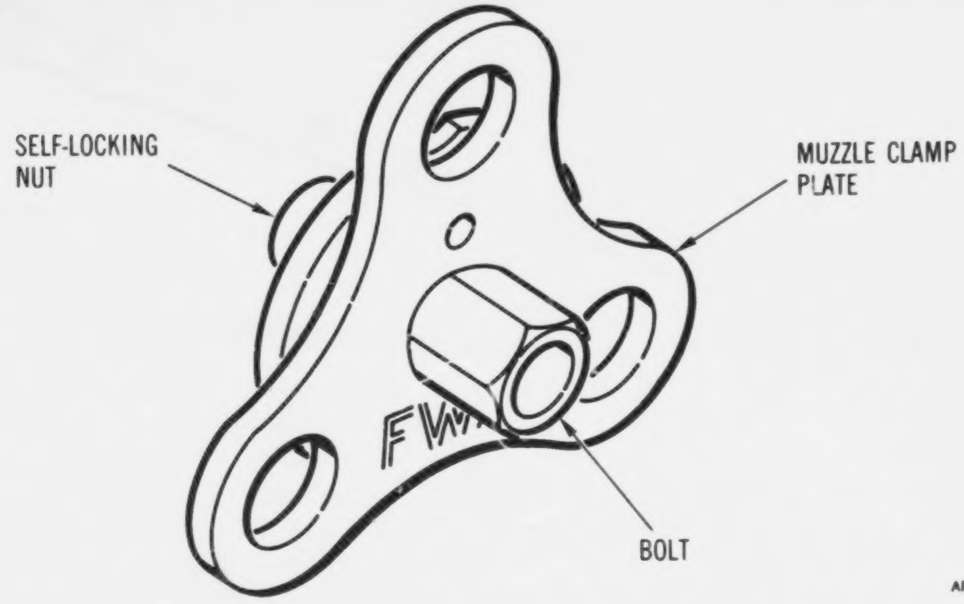
Turret-mounted, air-cooled, three-barrel, 20-mm automatic gun. Utilizes a rotary action mechanism, contained within a fixed rotor housing, and a rotating barrel cluster. Operates at a firing rate of 730 ±50 shots-per-minute. Drive power is provided by the gun drive. The M197 gun consists of the following major components.


FIRING CONTACT
MID-BARREL CLAMP
MUZZLE CLAMP PLATE
BARRELS
ROTOR AND BREECH BOLTS (WITHIN ROTOR HOUSING)
ROTOR HOUSING

ARR82-27769

MUZZLE CLAMP PLATE

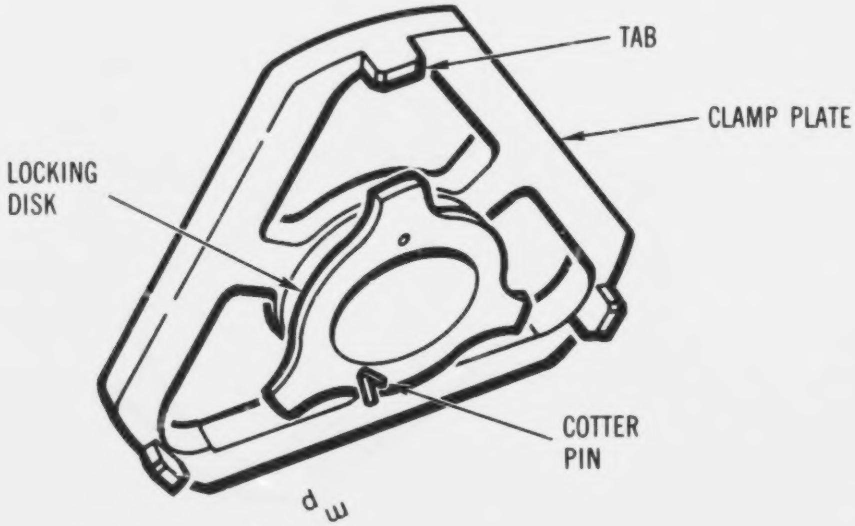
Located at outer end of barrel cluster. Restrains individual barrel movement during firing. Secured in position against shoulders on the barrels by a bolt and self-locking nut.


SELF-LOCKING
NUT
MUZZLE CLAMP
PLATE
FW
BOLT

ARR82-27770

MID-BARREL CLAMP

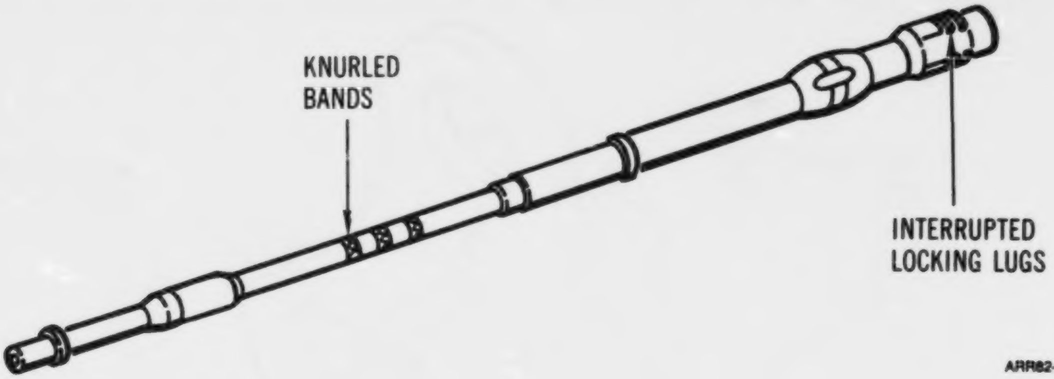
Located near center of the barrel cluster. Three tabs on the clamp plate prevent rotational movement of individual barrels. Secured in position by rotating the locking disk to LOCK position. Gun rotation, barrel detents, and a cotter pin prevent the Mid-Barrel Clamp from unlocking.


TAB
CLAMP PLATE
LOCKING
DISK
COTTER
PIN

ARR82-27771

BARRELS

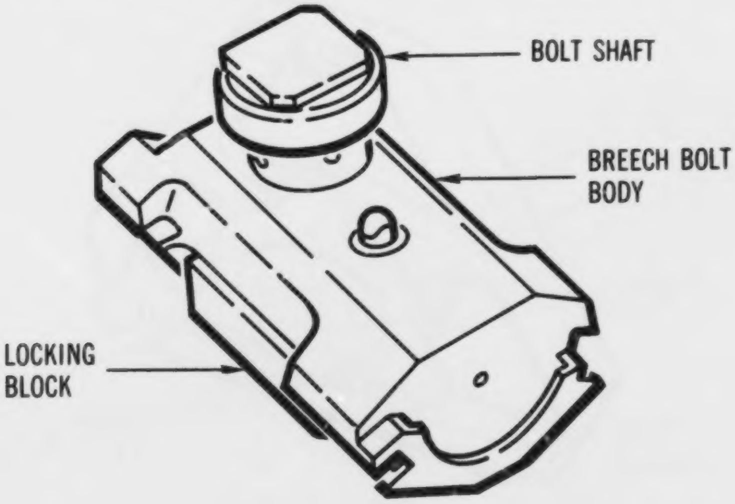
Cluster-mounted in forward end of rotor. Three rows of interrupted locking lugs engage similar locking lugs in the rotor. Knurled bands provide a gripping surface for installation and removal of the barrels.



ARR82-27772

BREECH BOLTS

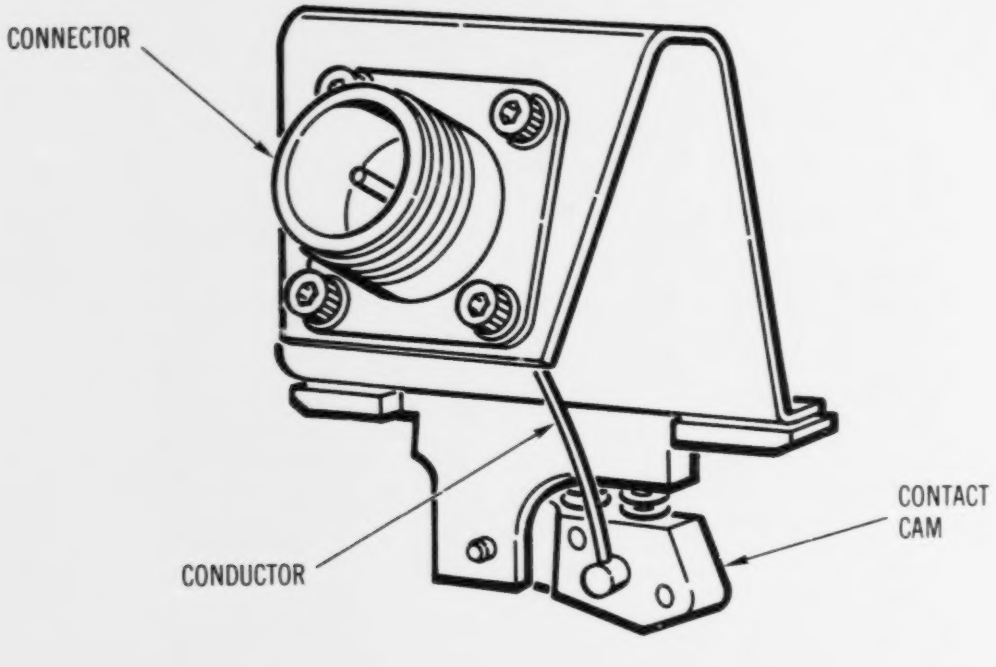
Three breech bolts are used in the M197 gun. Each breech bolt consists of a bolt shaft, locking block, firing circuit components, and a breech bolt body. Two types of breech bolts are available for use. Intermixing the two types of breech bolts is not recommended. The improved breech bolt differs from the standard breech bolt in internal construction and parts life. Slots or grooves in the side of the breech bolt permit the breech bolt to slide along the rotor tracks. The bolt shaft determines the position of the breech bolt as it follows the main cam path in the rotor housing. The extractor lip on the front of the breech bolt body engages the rim of a round and controls the forward and aft position of the round as it cycles through the M197 gun. The radial position of the round is controlled by the inner wall of the rotor housing. Each breech bolt picks up a round as it enters the M197 gun, transports it to the firing chamber, locks it into firing position, transmits firing voltage to the primer of the round, extracts the empty case from the chamber, and transports the empty case to the guide bar where it is cammed out of the M197 gun.



ARR82-27773

FIRING CONTACT

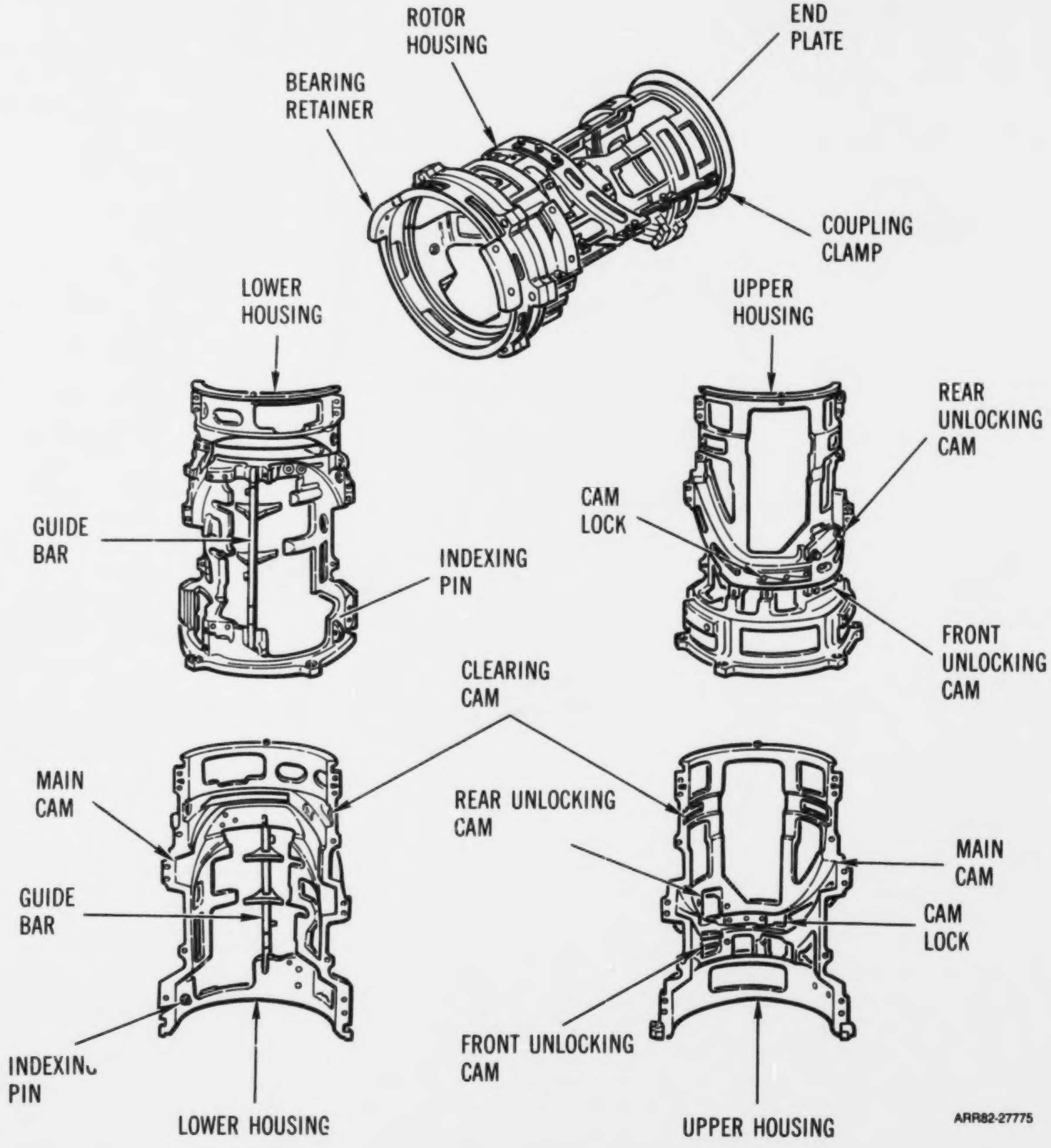
Mounted on rotor housing. Provides interface between an external source of fire volts and the M197 gun. Provides an electrical path through the rotor housing to the breech bolts. Circuit is through the connector and conductor to the insulated insert in the contact cam. When a breech bolt passes under the contact cam, the fire volts circuit is completed through the breech bolt cam and firing pin to the electrically-primed ammunition.



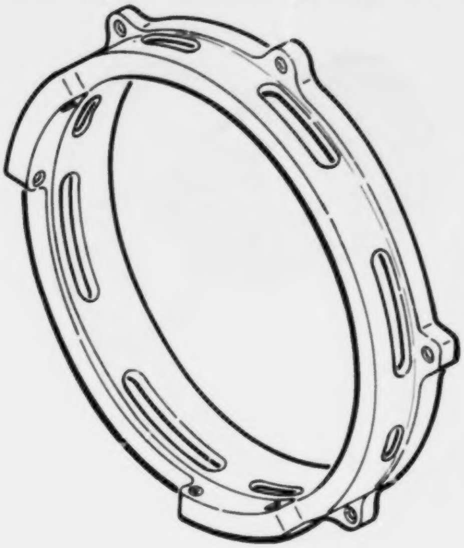
ARR82-27774

ROTOR HOUSING AND ASSOCIATED PARTS

The rear housing consists of an upper and a lower housing half assembled as a set. The cam paths in the rotor housing control the movement of the breech bolts. The main cam causes the breech bolts to move forward and backward along the rotor tracks as the rotor turns. The clearing cam provides for removal of the breech bolts. The following parts are mounted on the rotor housing.

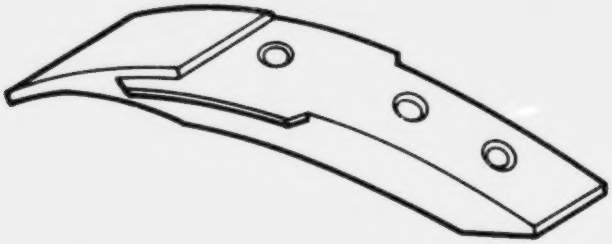

ROTOR HOUSING
END PLATE
BEARING RETAINER
COUPLING CLAMP
LOWER HOUSING
UPPER HOUSING
REAR UNLOCKING CAM
GUIDE BAR
CAM LOCK
INDEXING PIN
FRONT UNLOCKING CAM
CLEARING CAM
MAIN CAM
REAR UNLOCKING CAM
MAIN CAM
GUIDE BAR
CAM LOCK
FRONT UNLOCKING CAM
INDEXING PIN
LOWER HOUSING
UPPER HOUSING
ARR82-27775

Bearing Retainer. Serves as a seat for the ball bearing at the forward end of the rotor.



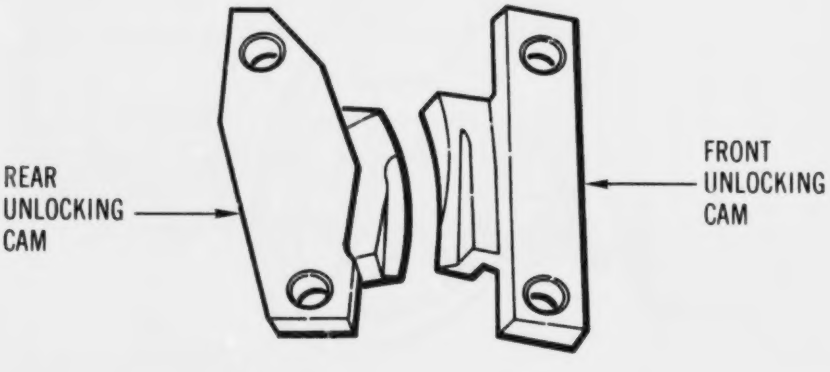
ARR82-27776

Cam Lock. Locks breech bolt in battery by forcing the bolt shaft downward to engage the locking block in the locking well of the rotor.



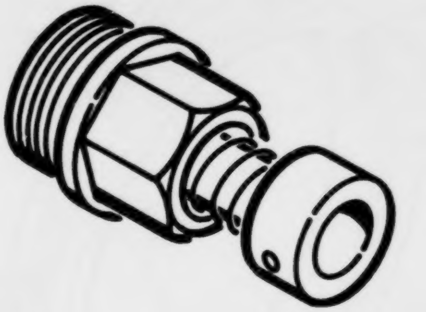
ARR82-27777

Front and Rear Unlocking Cams. Unlock breech bolt after firing by lifting the bolt shaft to disengage the locking block from the locking well in the rotor.



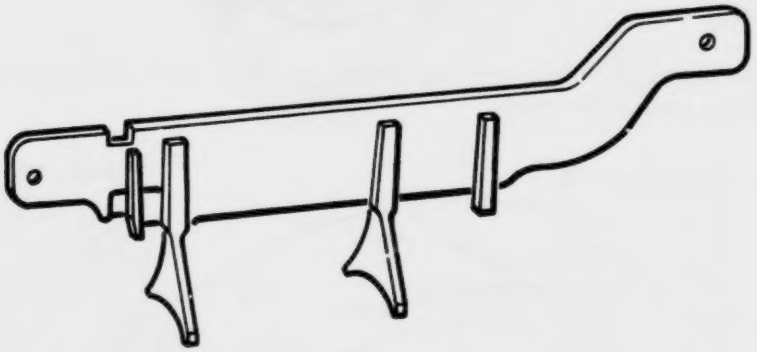
ARR82-27778

Indexing Pin. Times M197 gun for installation of timed M89E1 feeder.



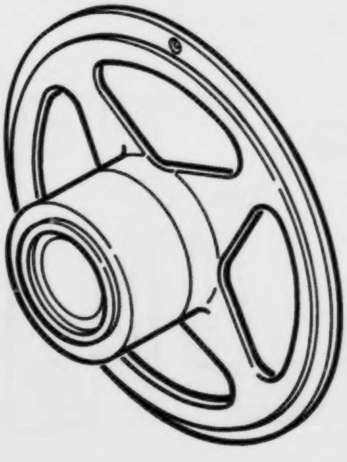
ARR82-27779

Guide Bar. Guides rounds into and out of the M197 gun.



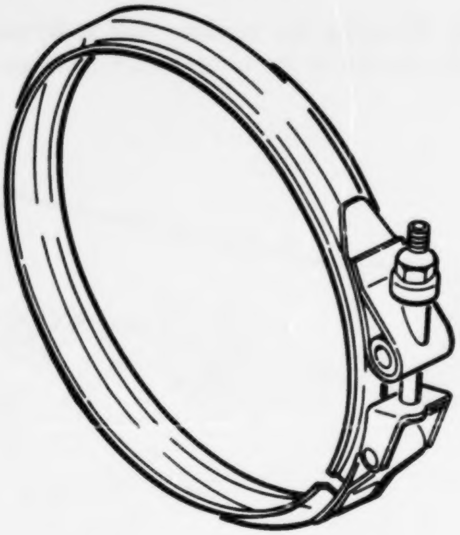
ARR82-27780

End Plate. Serves as the inner race for the needle bearing at the aft end of rotor. Provides the aft mounting point for the M197 gun.



ARR82-27781

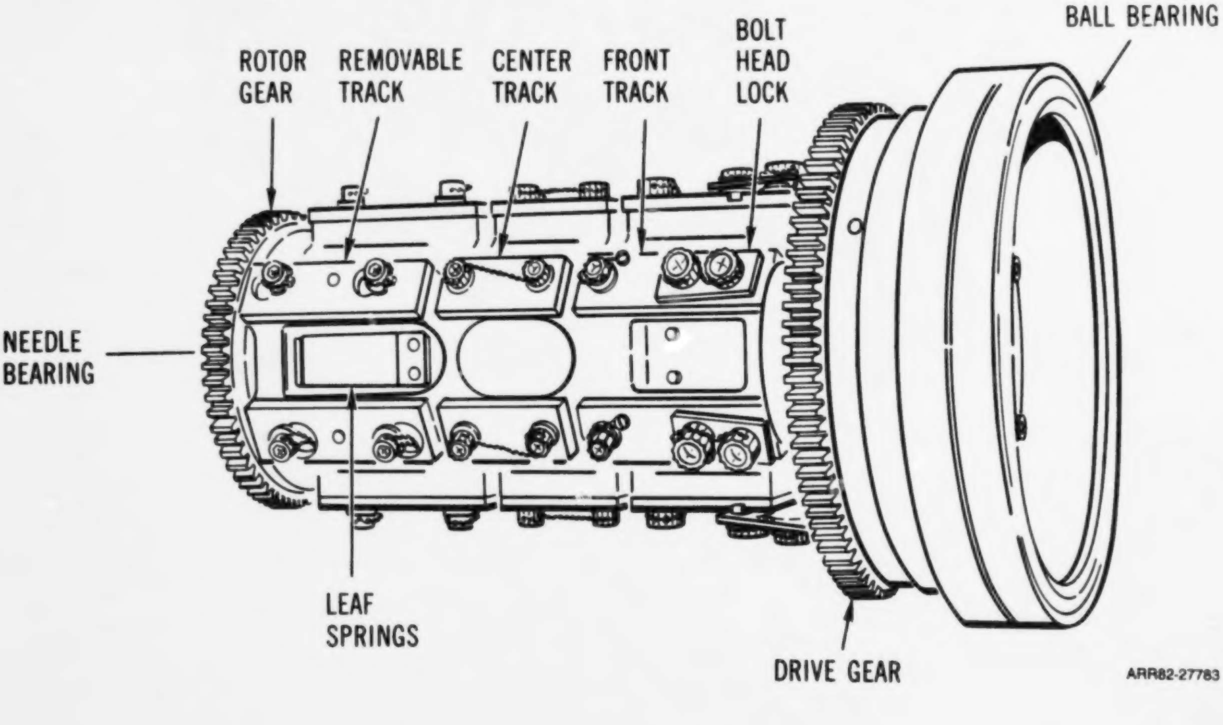
Coupling Clamp. Secures the end plate to the rotor housing.



ARR82-27782

ROTOR

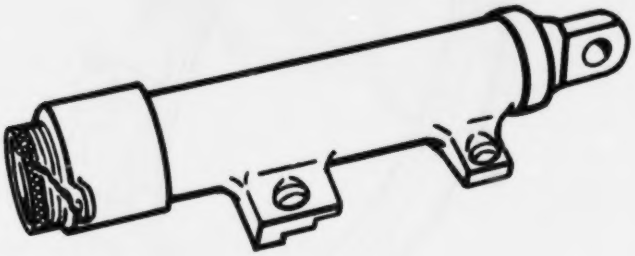
Major component of the M197 gun. Provides a mounting for the rotor tracks, rotor gear, ball bearing, needle bearing, and the leaf springs. Interrupted locking lugs in the forward end of the rotor engage similar locking lugs on the barrels. Six sets of rotor tracks retain and guide the breech bolts as they move along the rotor. Each set consists of a front track, center track, and a removable track. The removable tracks permit installation and removal of the breech bolts. The forward end of the rotor is supported by an external double-row ball bearing. The aft end of the rotor is supported by an internal needle bearing.


ROTOR GEAR
REMOVABLE TRACK
CENTER TRACK
FRONT TRACK
BOLT HEAD LOCK
BALL BEARING
NEEDLE BEARING
LEAF SPRINGS
DRIVE GEAR

ARR82-27783

RECOIL ADAPTER

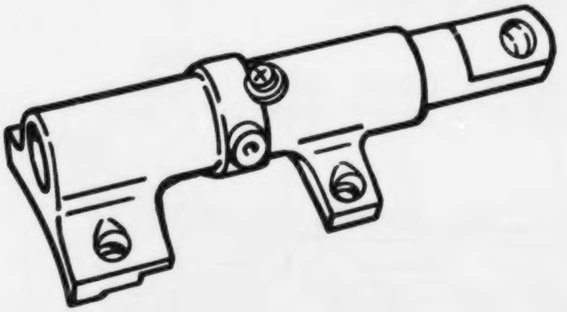
Mounted on the M197 gun. Provides the forward, left side, mounting point for the M197 gun. Dampens the recoil loads transmitted to the turret structure when the M197 gun is firing.



ARR82-27784

SLIDER

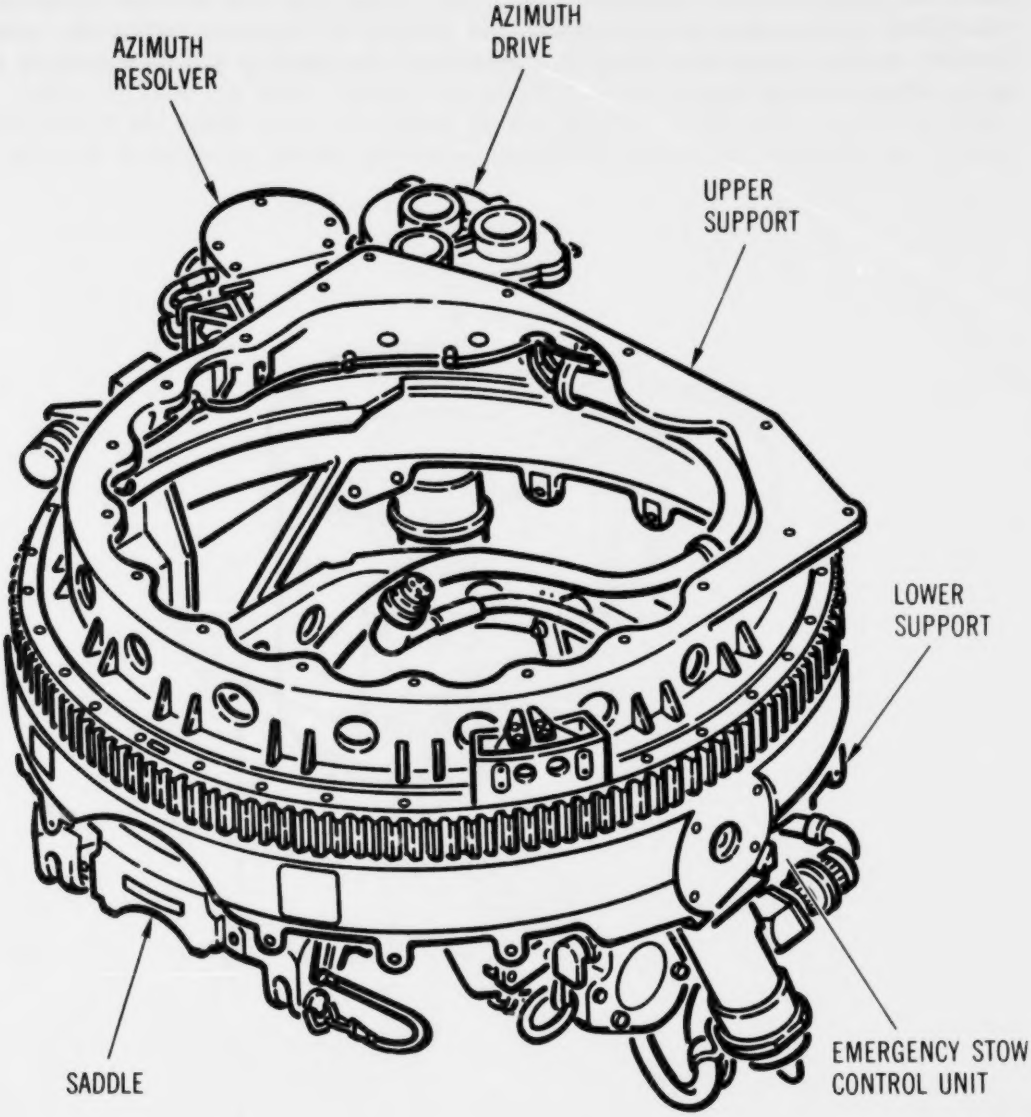
Mounted on the M197 gun. Serves as a guide and as the forward, right side, mounting point for the M197 gun.



ARR82-27785

TURRET

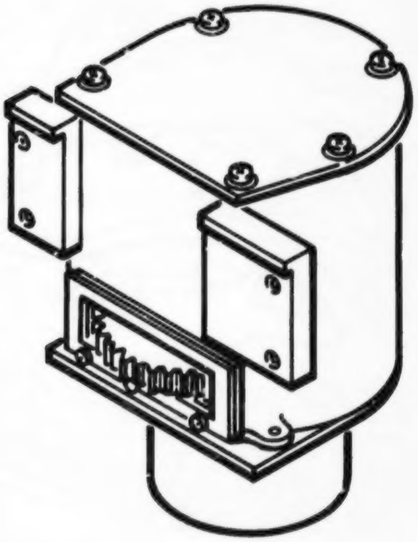
The turret consists of the following major components.


AZIMUTH RESOLVER
AZIMUTH DRIVE
UPPER SUPPORT
LOWER SUPPORT
SADDLE
EMERGENCY STOW CONTROL UNIT

ARR82-27786

AZIMUTH RESOLVER

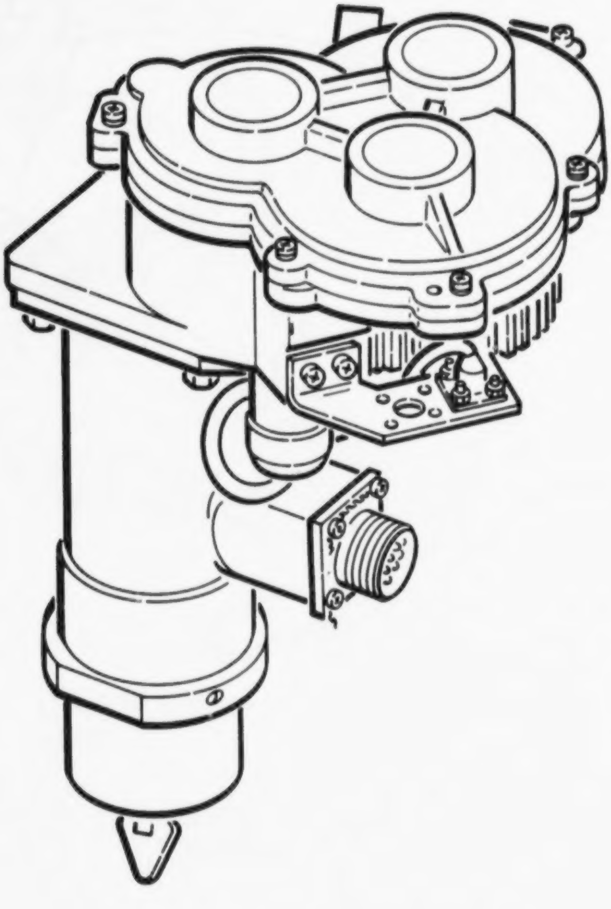
Mounted on the upper support and geared to the ring gear on the lower support. Contains the azimuth stow switch and a resolver. The azimuth stow switch is a mechanically actuated, three-deck (S1, S2, and S3) cam switch. When switches S1 and S2 are actuated, emergency stow power is routed to the azimuth drive motor brake and the azimuth drive amplifier in the emergency stow control unit to position the turret to 0° azimuth. When the turret is not in 0° azimuth, switch S3 prevents firing of wing stores. The resolver provides azimuth position signals for the azimuth servo loop.



ARR82-27787

AZIMUTH DRIVE

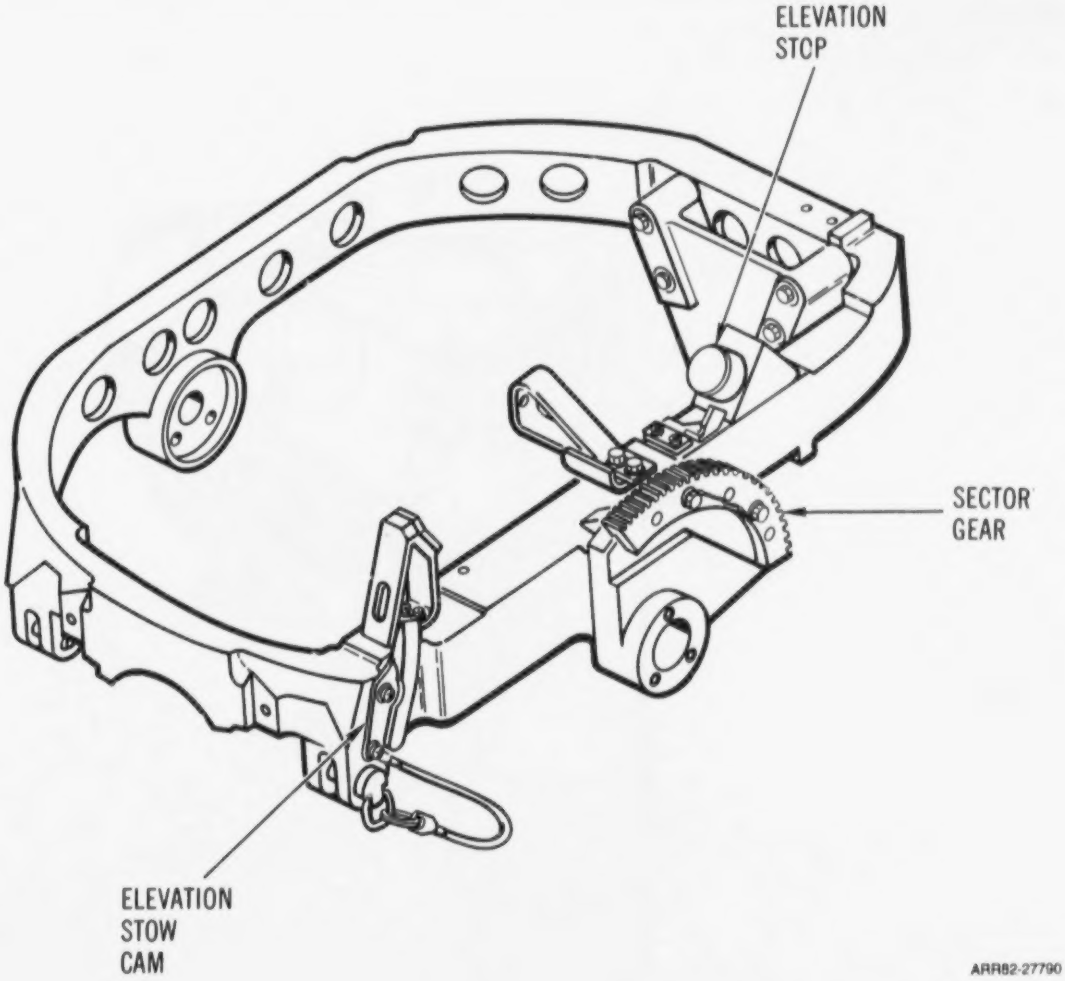
Mounted on the upper support and geared to the ring gear on the lower support. Consists of an azimuth drive motor, gearbox, and a tachometer. The gear train is protected by a slip clutch in the event external obstructions are encountered. The tachometer provides an azimuth rate feedback signal to the servo loop to maintain loop stability. The azimuth drive motor contains a spring-operated brake to lock the lower support in position when power is not applied. The brake is released electrically when power is applied by the azimuth servo loop. A manual brake release on the azimuth drive motor allows the lower support to be moved manually for ground servicing.



ARR82-27789

SADDLE

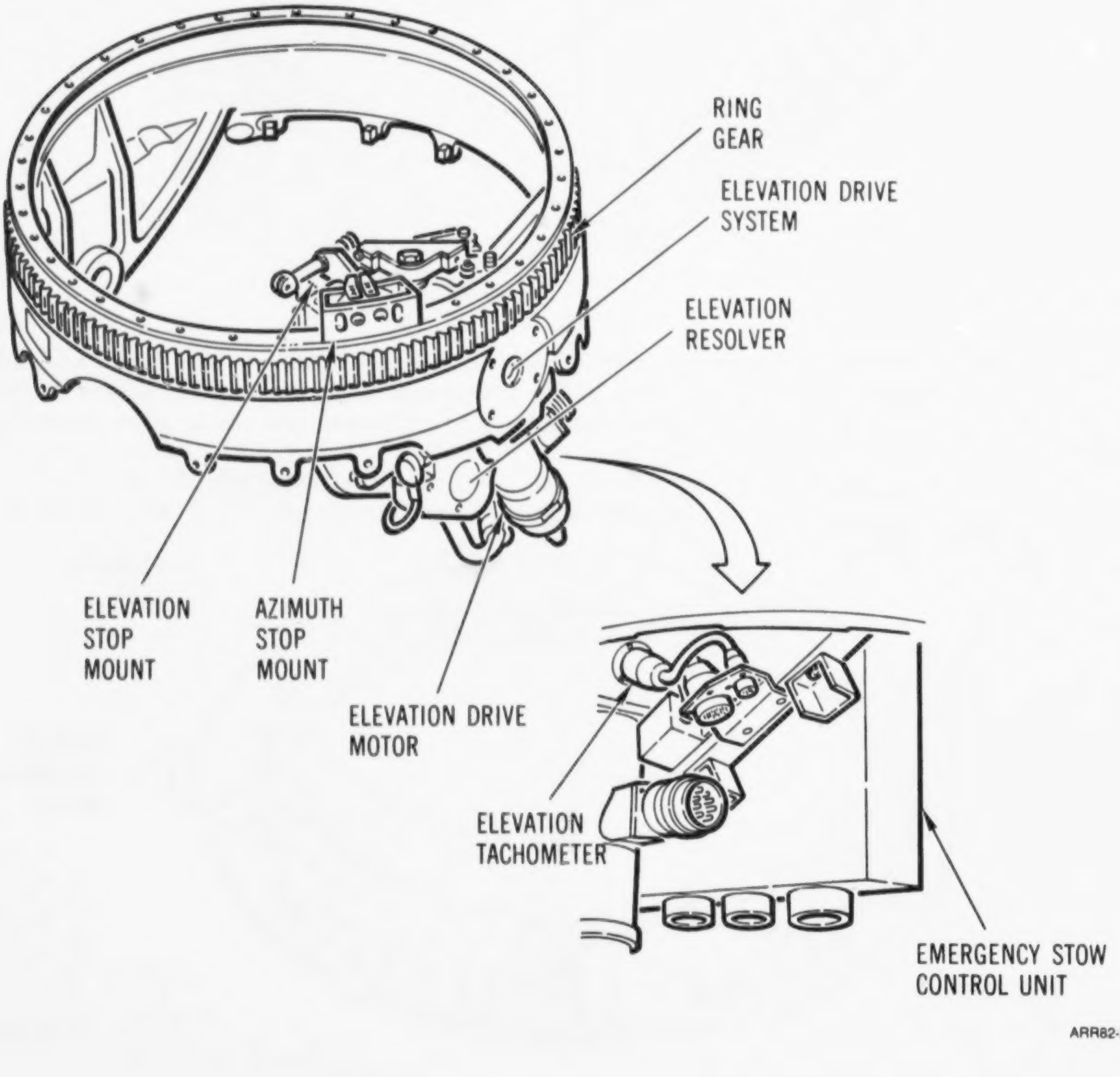
Mounted through bearings to the lower support. Consists of a frame to support the M197 gun. Provides a mount for the elevation stop and the elevation stow cam. The saddle sector gear meshes with the output gear of the elevation drive system.


ELEVATION
STOP
SECTOR
GEAR
ELEVATION
STOW
CAM

ARR82-27790

LOWER SUPPORT

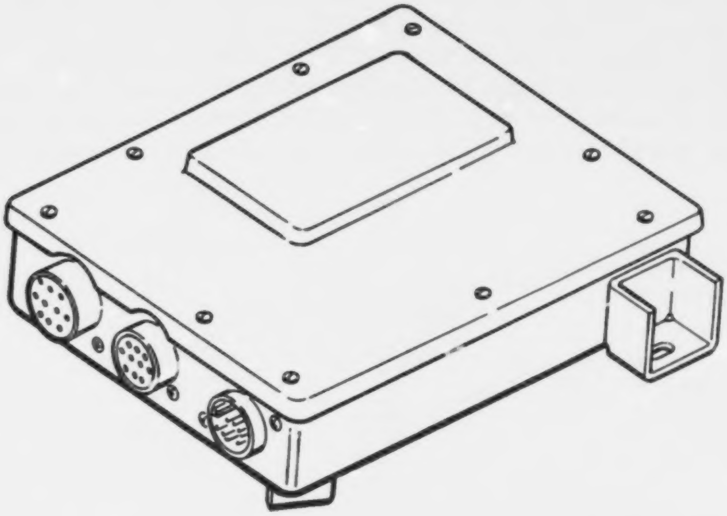
Mounted to the upper support through the azimuth bearing. Contains the elevation drive system. Provides a mount for the elevation stops, elevation proximity switches, and the emergency stow control unit. The lower support ring gear meshes with the drive gear of the azimuth resolver and the output gear of the azimuth drive. The elevation drive system consists of an elevation drive motor, gear train, elevation resolver, and a tachometer. The gear train is protected by a slip clutch in the event external obstructions are encountered during turret slew. The resolver provides elevation position signals for the elevation servo loop. The tachometer provides an elevation rate feedback signal to the servo loop to maintain loop stability. The elevation drive motor contains a spring-operated brake to lock the saddle in position when power is not applied. The brake is released electrically when power is applied by the elevation servo system. A manual brake release on the elevation drive motor allows the saddle to be moved manually for ground servicing.


RING GEAR
ELEVATION DRIVE SYSTEM
ELEVATION RESOLVER
ELEVATION STOP MOUNT
AZIMUTH STOP MOUNT
ELEVATION DRIVE MOTOR
ELEVATION TACHOMETER
EMERGENCY STOW CONTROL UNIT

ARR82-27791

EMERGENCY STOW CONTROL UNIT

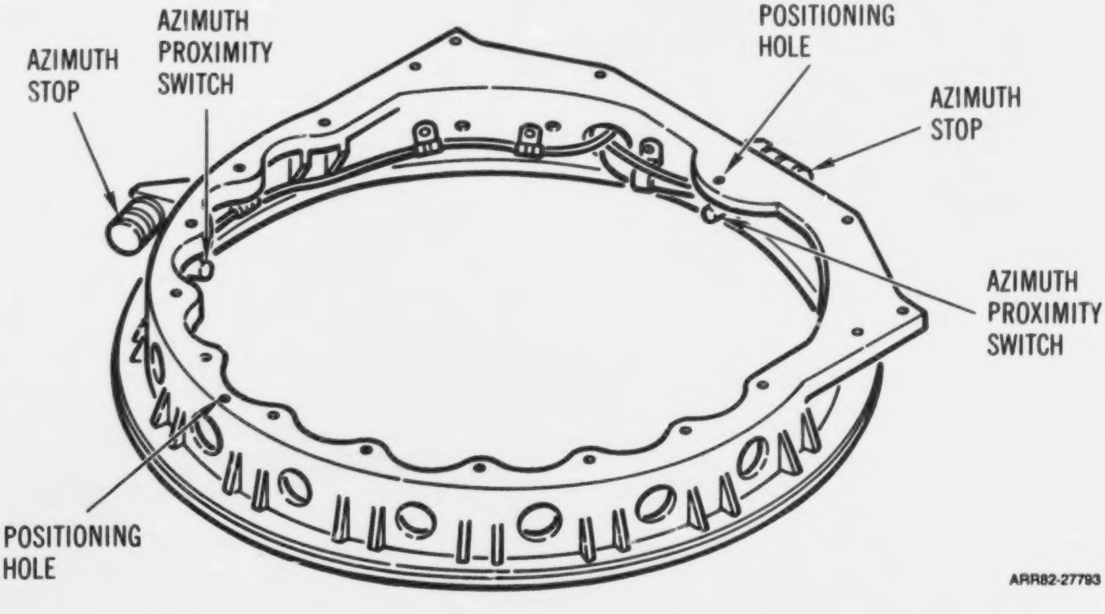
Mounted on the lower support. Contains the circuitry to automatically drive the turret to the emergency stow position whenever normal operating power is removed or lost. The emergency stow position is a minimum of 10° up elevation and 0° ±5° azimuth.



ARR82-27792

UPPER SUPPORT

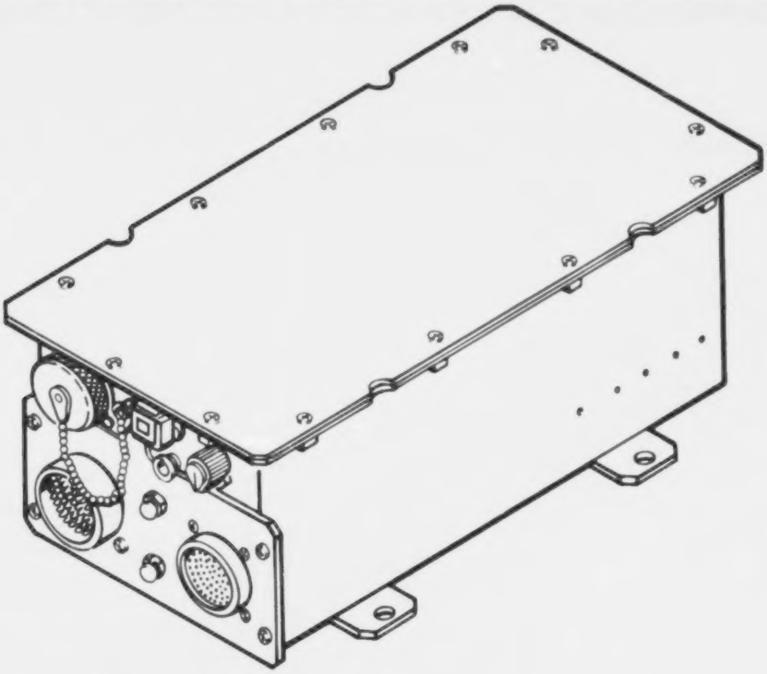
Provides turret to helicopter mounting points. Two positioning holes in the upper support mounting flange engage two positioning pins in the airframe to align the turret structure to the helicopter. Serves as a mount for the azimuth bearing, azimuth stops, and the azimuth proximity switches.


AZIMUTH STOP
AZIMUTH PROXIMITY SWITCH
POSITIONING HOLE
AZIMUTH STOP
AZIMUTH PROXIMITY SWITCH
POSITIONING HOLE

ARR82-27793

LOGIC CONTROL UNIT

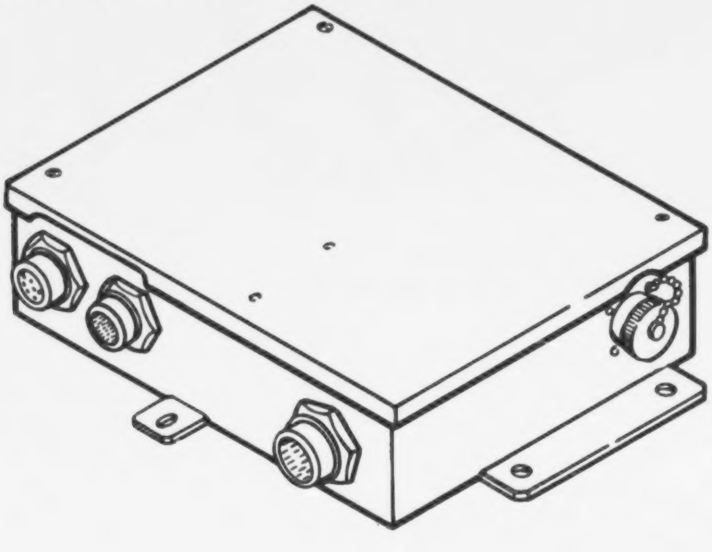
Located in an access compartment on the left side of the helicopter aft of the ammunition bay. Consists of four circuit card assemblies, a transformer, and an elapsed time indicator. Provides stabilization control, coincidence control, error detection, and depression limit.



ARR82-27794

GUN CONTROL UNIT

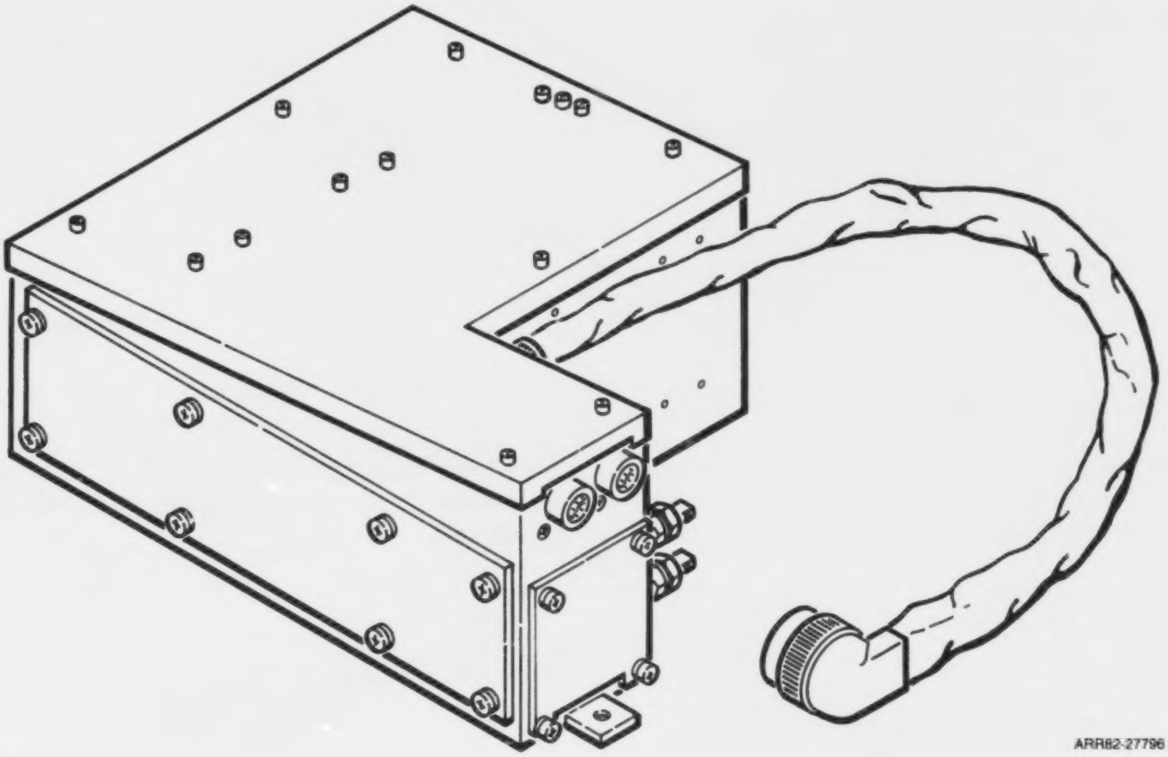
Mounted on the bulkhead aft of the turret. Consists of five circuit card assemblies, an EMI filter, a transformer, the fire volts power supply, and an elapsed time indicator. Controls voltages for gun drive power, firing, and operation of the feeder solenoid.



ARR82-27795

TURRET CONTROL UNIT

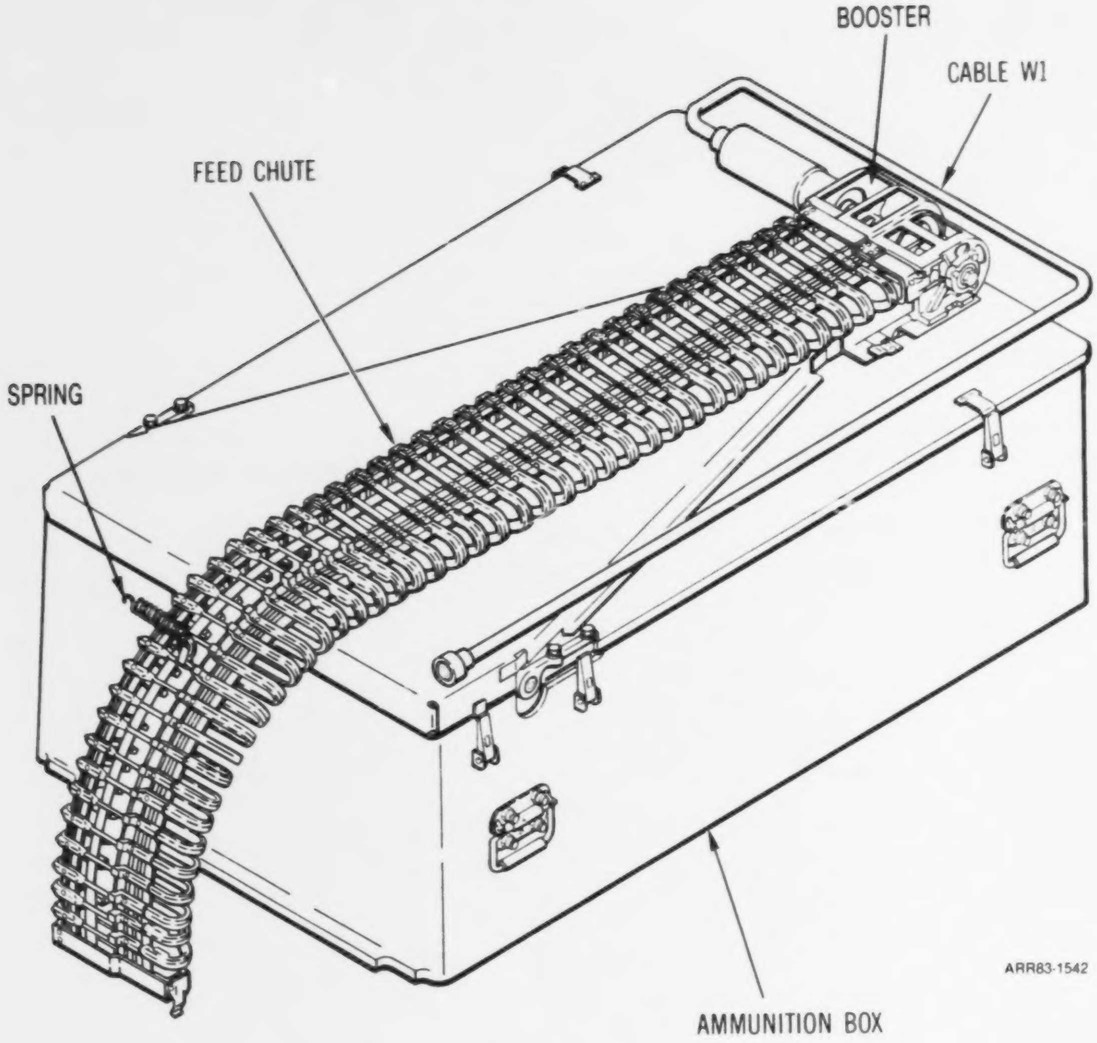
Located in an access compartment on the right side of the helicopter directly below the gunner canopy. Consists of four circuit card assemblies, two power modules, an EMI filter network, a transformer, and an elapsed time indicator. Controls power to azimuth and elevation drive motors for turret positioning.



ARR82-27796

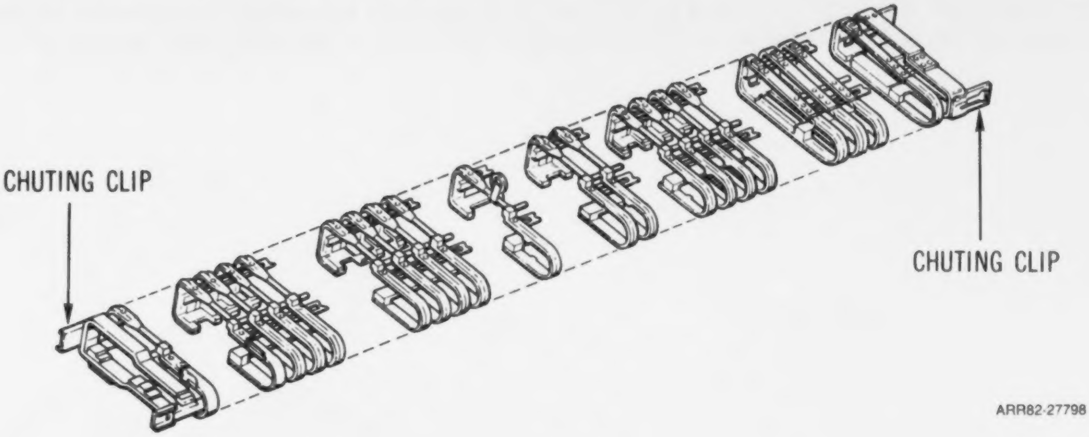
AMMUNITION FEED SYSTEM

Consists of a feed chute, cable W1, and an ammunition box. Stores and supplies linked ammunition to the M89E1 feeder and M197 gun. A spring connected between the feed chute and the airframe holds the feed chute in position to allow a smooth flow of ammunition through the feed chute. Electrical power to operate the booster mounted on the ammunition box cover is supplied through cable W1.


BOOSTER
CABLE W1
FEED CHUTE
SPRING
ARR83-1542
AMMUNITION BOX

FEED CHUTE

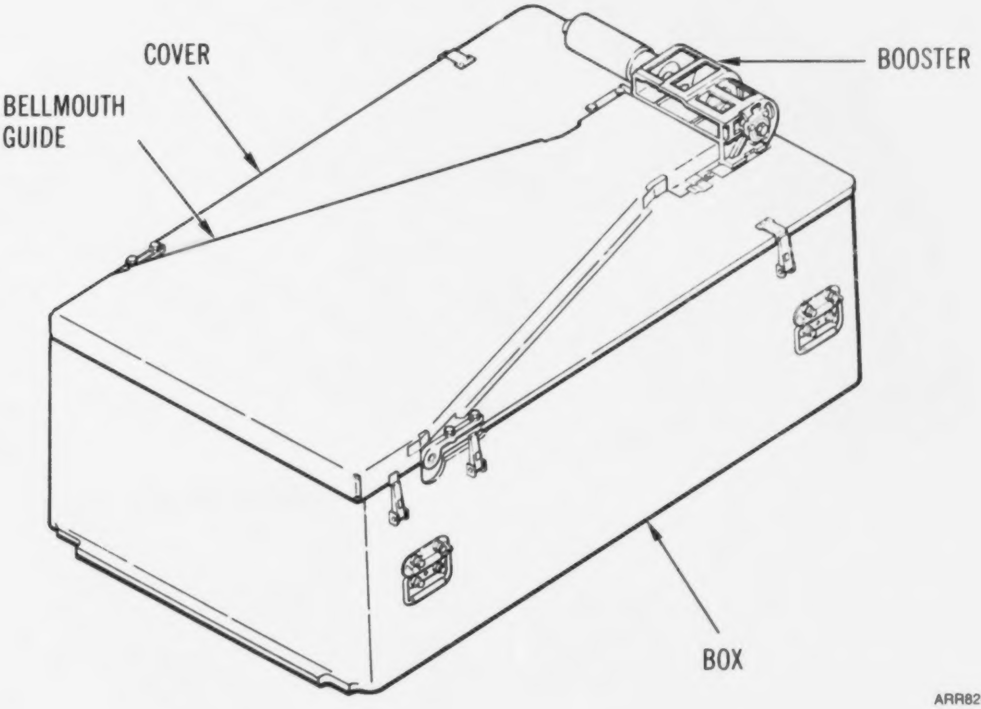
Connects between the booster and the M89E1 feeder. Chuting clips at each end of the feed chute allow removal and installation of the chute.


CHUTING CLIP
CHUTING CLIP

ARR82-27798

AMMUNITION BOX

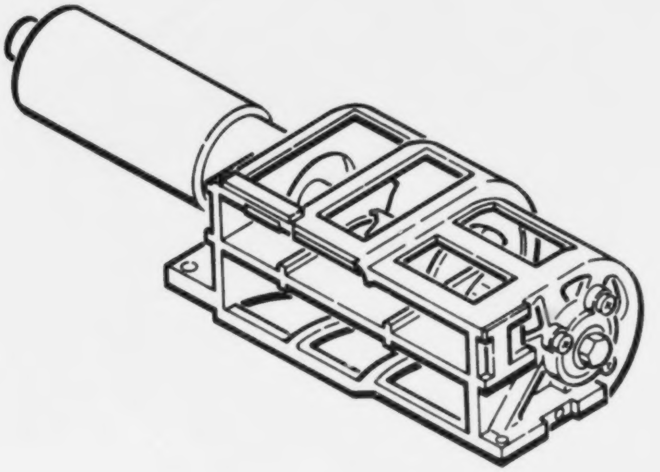
Consists of a bellmouth guide, cover, booster, and a 3-bay box. Ammunition stored in the box feeds over a roller at the end of the cover and through the bellmouth guide to the booster.


COVER
BELLMOUTH GUIDE
BOOSTER
BOX

ARR82-27799

BOOSTER

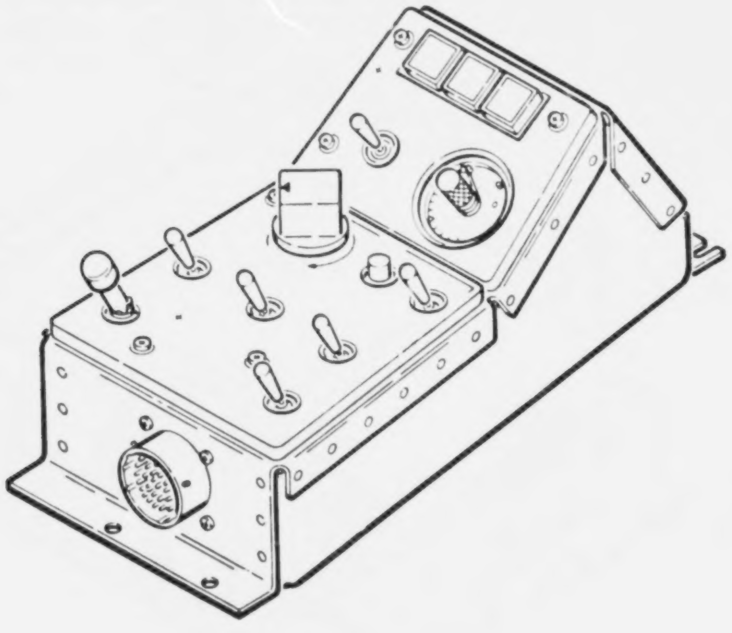
Mounted on the ammunition box cover. Consists of the booster motor, sprocket shaft, and a booster housing with integral link and round guides. The booster provides a smooth, controlled flow of linked ammunition from the ammunition box through the feed chute to the M89E1 feeder.



ARR82-27800

GUNNER ARMAMENT CONTROL PANEL

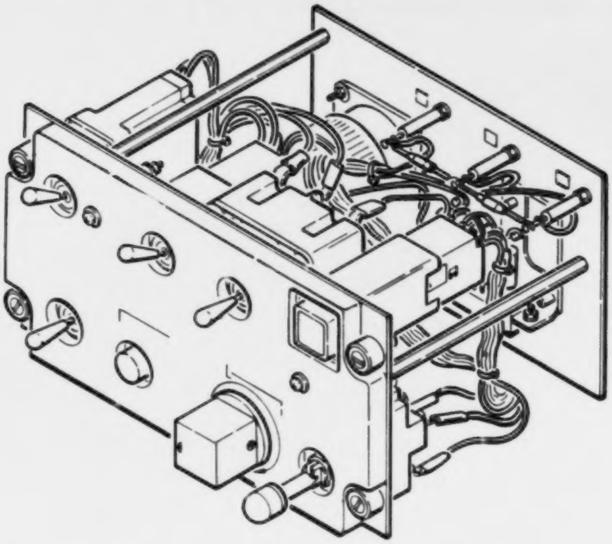
Located in the right console in the gunner cockpit. Contains switches and indicators for gunner control and operation of the RMS and turret subsystem.



ARR82-27801

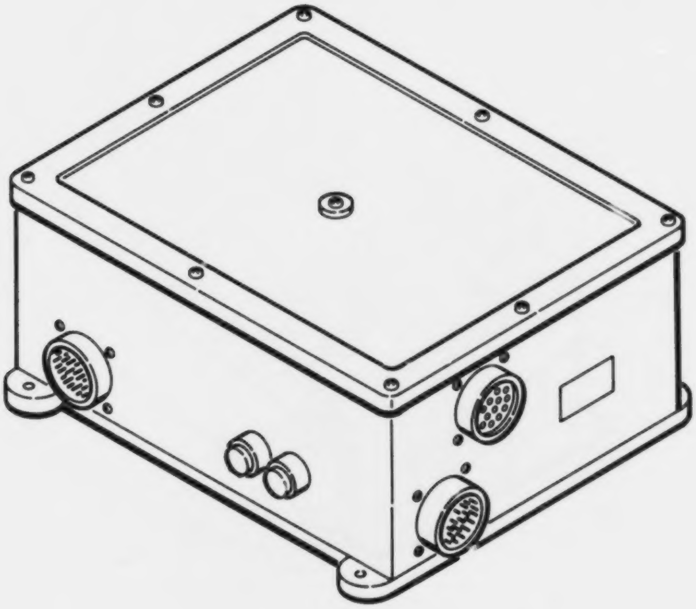
PILOT ARMAMENT CONTROL PANEL

Located in the lower left corner of the console in the pilot cockpit. Contains switches and indicators for pilot control of the RMS and turret subsystem.



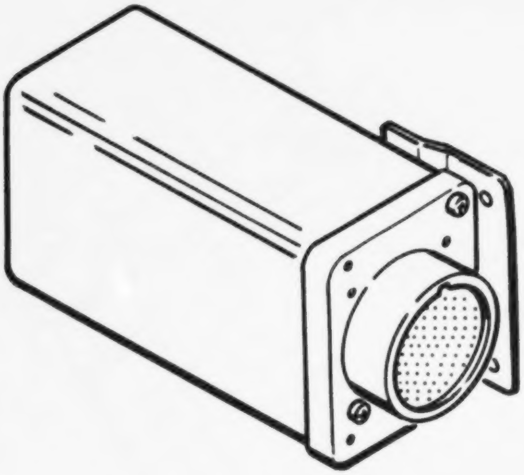
INTERFACE CONTROL UNIT

Located in an access compartment below the front of the right wing. Contains the signal switching, signal buffering, reticle lamp and retract circuitry to interface the FCC, HSS, TSU, and the airborne laser tracker (ALT) with the turret subsystem. The FCC adds offset signals through the IFCU buffer amplifiers for range and air data compensation and boresight corrections using the TSU as a baseline.



TURRET BUFFER AMPLIFIER

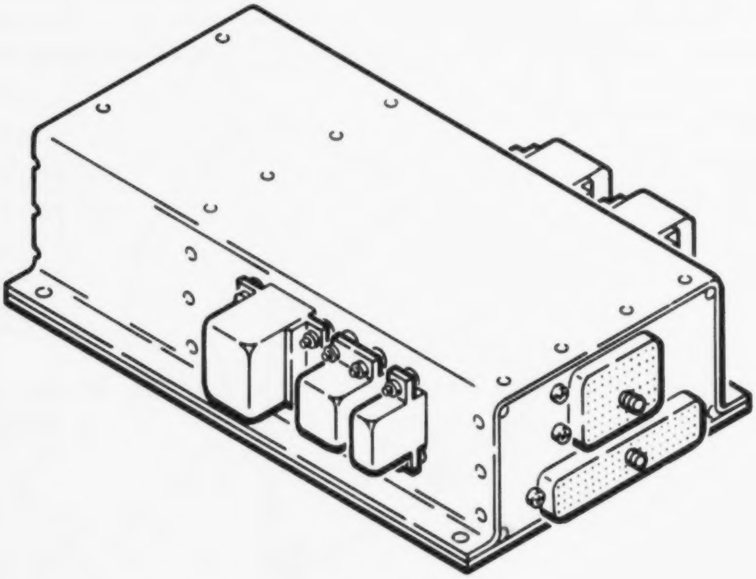
Mounted on the bulkhead aft of the turret. Consists of two electrical connectors and a circuit card assembly. Contains the circuitry to eliminate noise and provide loads for the turret resolvers. Provides relay interlock switching to interrupt the firing voltage if an internal power supply failure occurs.



ARR82-27804

LOGIC RELAY ASSEMBLY

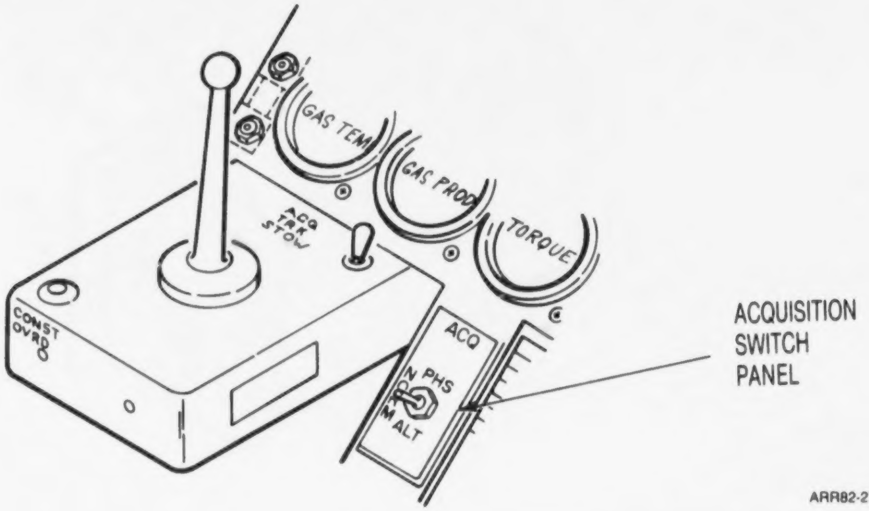
Located in an access compartment on the underside of the helicopter below the ammunition bay. Consists of three circuit card assemblies, five relays, and two wiring harnesses. Provides switching for the turret subsystem, TOW, wing stores, night vision goggles, and control of the armament subsystem indicators.



ARR82-27805

ACQUISITION SWITCH PANEL

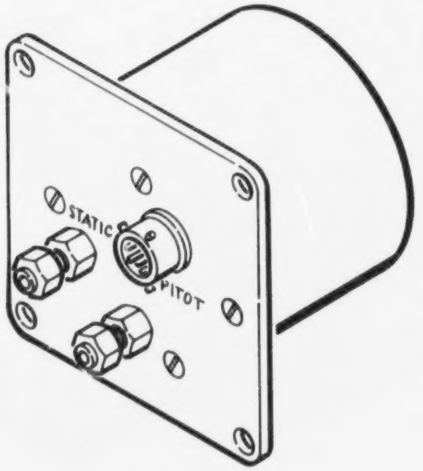
Located in the lower right corner of the console in the pilot cockpit. Provides a mounting for the PHS/NORM/ALT switch. Positioning the switch to PHS allows the TSU to be alined with the pilot helmet sight (PHS). Positioning the switch to ALT allows the TSU to be alined with the ALT when a designated target is being tracked. Positioning the switch to NORM allows the TSU to be controlled by the sight hand control track control stick.



ARR82-27806

AIRSPEED TRANSDUCER

Located in an access compartment on the left side of the helicopter above the ammunition bay. Provides an unscaled velocity signal to the stabilization control amplifier of the M65 TOW Guided Missile System. Static and pitot air pressure are supplied to the airspeed transducer. A reference voltage is applied to a potentiometer within the airspeed transducer. Forward motion of the helicopter produces a differential pressure from the pitot system to the airspeed transducer. The differential pressure controls the relative position of the potentiometer wiper. The airspeed proportional voltage on the wiper is proportional to the airspeed of the helicopter.



ARR82-27807

DIFFERENCES BETWEEN MODELS

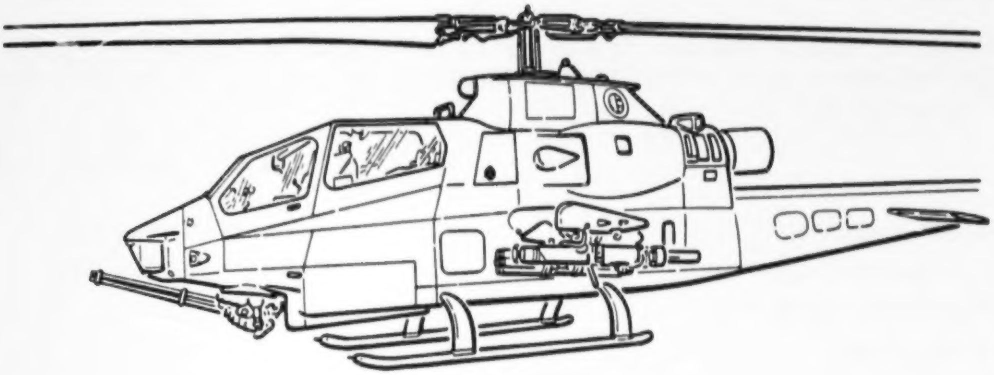
1-10. The major differences between the two models of the armament subsystem are identified in the following tabulated data. Refer to TM 9-1090-206-20-2 for additional information pertaining to armament subsystem M97A3 .

	M97A4	M97A3
M147 Rocket Management Subsystem	X	X
M136 Helmet Sight Subsystem	X	X
M76 Head-Up Display Subsystem	X	
M73 Pilot Reflex Sight		X
M26 Fire Control Computer	X	
M143 Air Data Subsystem	X	
M89E1 Feeder	X	X
Gun Drive	X	X
M197 Gun	X	X
Recoil Adapter and Slider	X	X
Turret	X	X
Logic Control Unit	X	X
Gun Control Unit	X	X
Turret Control Unit	X	X
Ammunition Feed System	X	X
Gunner Armament Control Panel (209-175-338-1)	X	
Gunner Armament Control Panel (209-075-768-1)		X
Pilot Armament Control Panel (209-175-339-1)	X	
Pilot Armament Control Panel (209-075-771-1)		X
Interface Control Unit (209-074-110-1)	X	
Interface Control Unit (209-074-051-3)		X
Turret Buffer Amplifier	X	
Logic Relay Assembly	X	
Acquisition Switch Panel (209-175-341-1)	X	
Acquisition Switch Panel (209-075-674-1)		X
Airspeed Transducer	X	X

EQUIPMENT DATA

1-11. Performance data for the turret subsystem and its major components are provided in the following tabulated data.

TURRET SUBSYSTEM



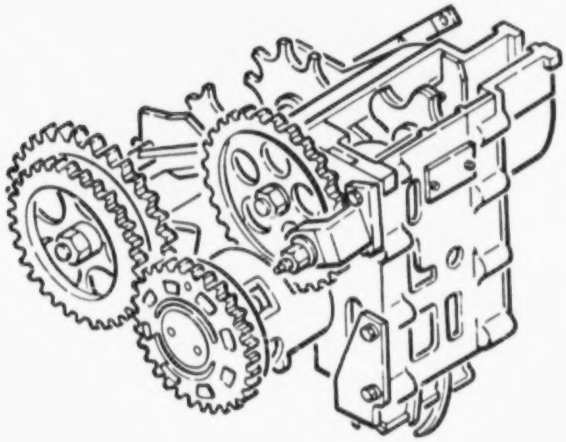
ARR82-27808

Mounting	Chin
Ammunition	
Type	20-mm (M50 series) linked (M14A2 links)
Capacity	750 rounds
Firing Rate	730 ± 50 shots-per-minute
Burst Limit	16 ± 4 rounds. Optional fireout
Clearing	Automatic after each burst
Case Ejection	Bottom of turret
Azimuth Limits	± 113° mechanical, ± 110° electrical
Elevation Limit	+ 13.6 to 21° (depending on azimuth position) mechanical, one degree less electrical
Depression Limit	
Normal Operation	− 53° 15′ mechanical, − 50° 15′ electrical
Ground Operation	5°
Slewing Rate	
Azimuth	Above 80°/sec (220° in 3.3 to 4.2 seconds)
Elevation	Above 60°/sec (65° in 1.6 to 1.8 seconds)
Slow slew (ground maintenance)	6° ± 2° per second
Position Accuracy	3 mils maximum
Modes of Operation	
Gunner Control	With TSU or HSS
Pilot Control	HSS or HUD (fixed forward 0° azimuth, 0° elevation)
Pilot Override	HSS
Automatic Stow	
Gunner in Control	+ 11° elevation, 0° azimuth
Pilot in Control (WPN CONTR switch set to PILOT)	+ 11° elevation, 0° azimuth
Pilot in Control (WPN CONTR switch set to FIXED)	0° elevation, 0° azimuth

TURRET SUBSYSTEM (cont)

Emergency Stow	+10° elevation (minimum), 0 +5° azimuth
Power Requirements	28 Vdc 200 amps, high level (HL) 10 amps, low level (LL) 115 V, 400 Hz
Weight	
Loaded	1000 pounds (approximate)
Without M197 gun, M89E1 feeder and ammunition	416 pounds
Reload Turnaround Time	15 minutes

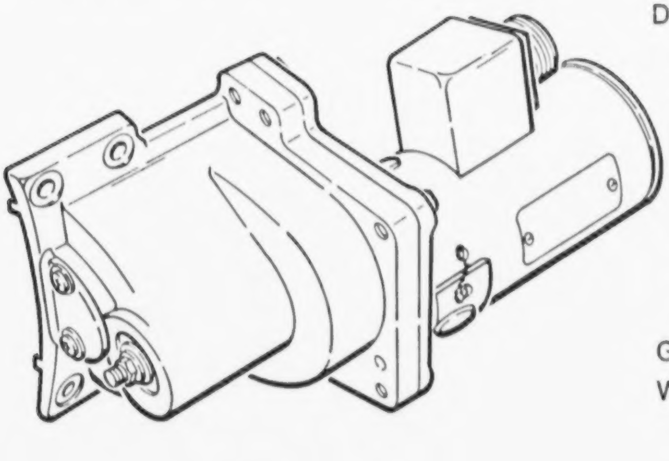
M89E1 FEEDER



Length	13 inches
Height	8 inches
Width	9.5 inches
Weight	22.5 pounds
Type of Link	M14 series
Type of Ammunition	M50 series
Drive	Gear
Power Requirements (Solenoid)	28 Vdc

ARR82-27809

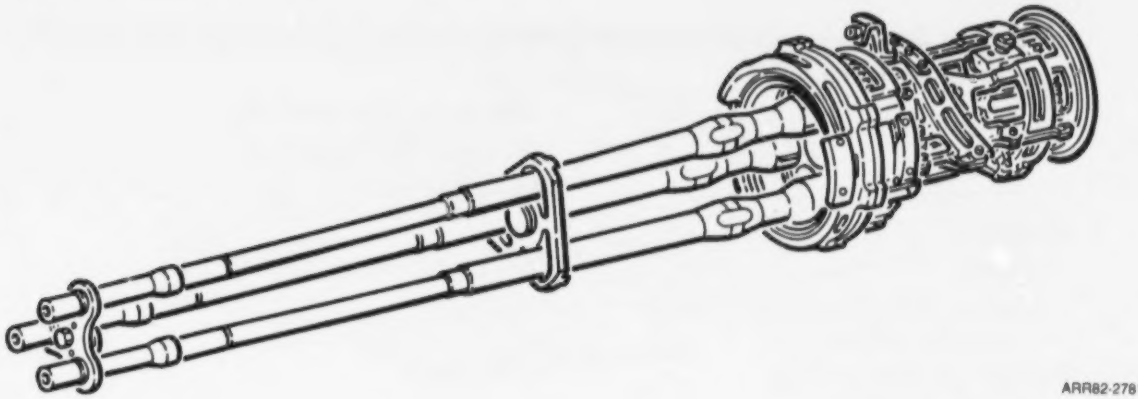
GUN DRIVE



Drive Motor	
Voltage	28 Vdc
Speed	6500 rpm
Starting Current	600 amps (maximum)
Direction of Rotation	Clockwise when viewed from spline end
Horsepower	3
Gear Ratio	28:1
Weight	11.4 pounds

ARR82-27810

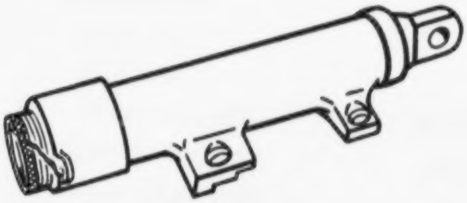
M197 GUN



ARR82-27811

Caliber	20-mm
Rate-of-Fire	730 ± 50 shots-per-minute
Effective Range	3000 meters
Muzzle Velocity	3380 ± 50 feet per second
Drive	Gear (external electric gun drive)
Rotation	Counterclockwise viewed from breech
Length Overall	72 inches
Weight	139 pounds
Number of Barrels	3
Length of Barrels	60 inches

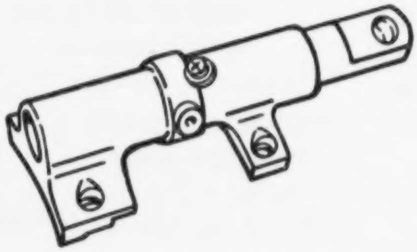
RECOIL ADAPTER



Weight	7.9 pounds
Preload	200 ± 50 pounds
Recoil Movement	1.5 inches (maximum)

ARR82-27812

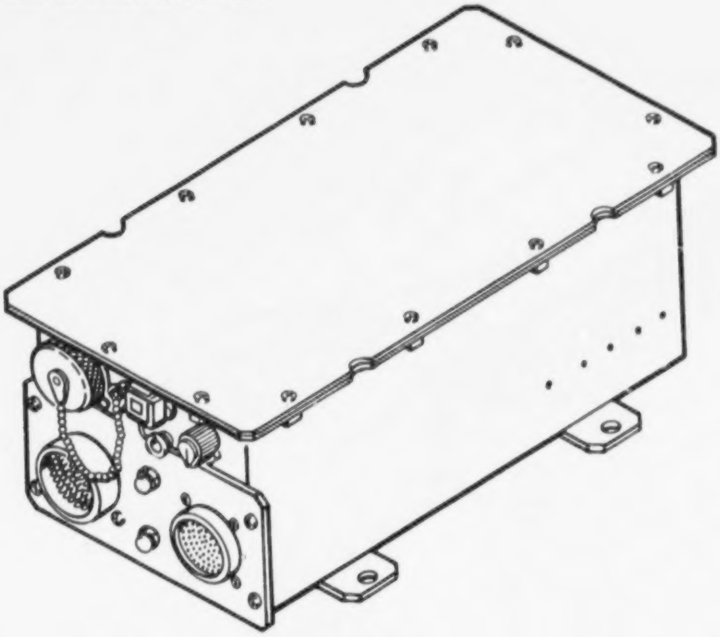
SLIDER



Weight	4.2 pounds
Preload	Not Applicable
Recoil Movement	Not Applicable

ARR82-27813

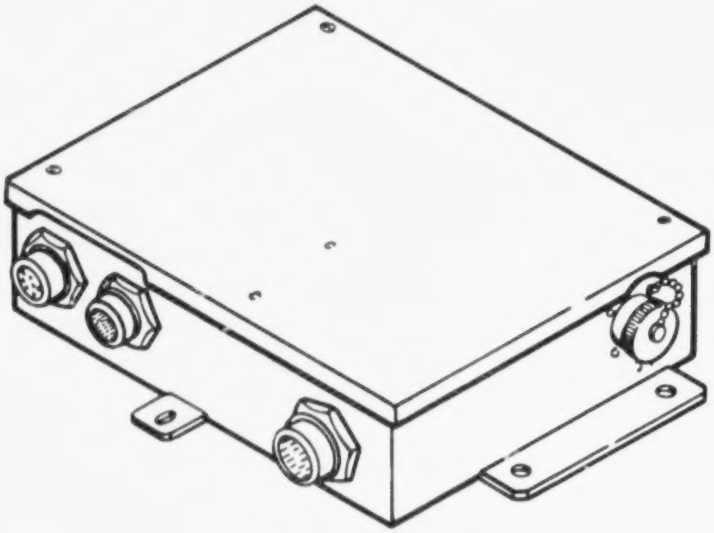
LOGIC CONTROL UNIT



Power Requirements	28 Vdc + 18 Vdc − 18 Vdc 115 Vac 26 Vac
Weight	4.8 pounds
Height	4.3 inches
Width	5.4 inches
Length	11.3 inches

ARR82-27814

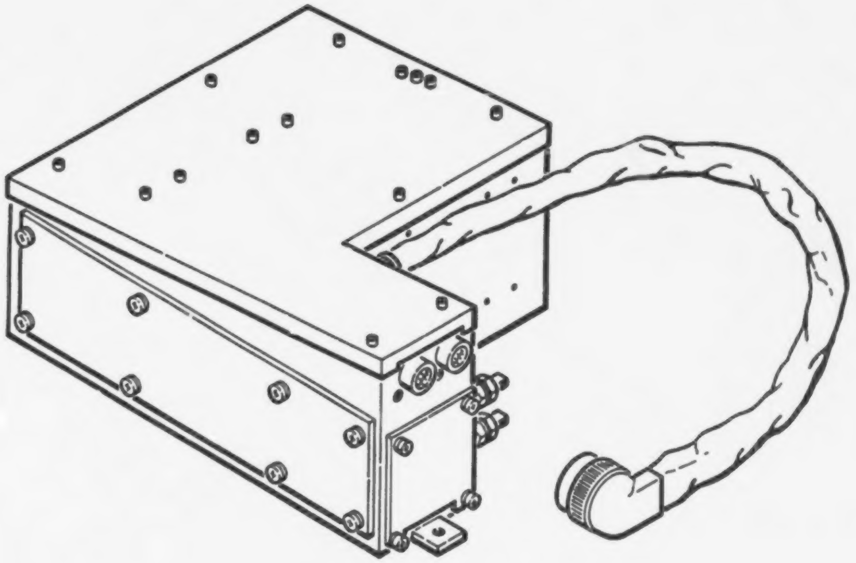
GUN CONTROL UNIT



ARR82-27815

Power Requirements	28 (22 to 30) Vdc, 15 amps (maximum) 115 ±5 V, 400 ±20 Hz, 95 VA (maximum)
Firing Voltage	250 to 400 Vdc, 0.5 amp
Weight	8.4 pounds
Height	2.78 inches
Width	8.95 inches
Length	12.09 inches

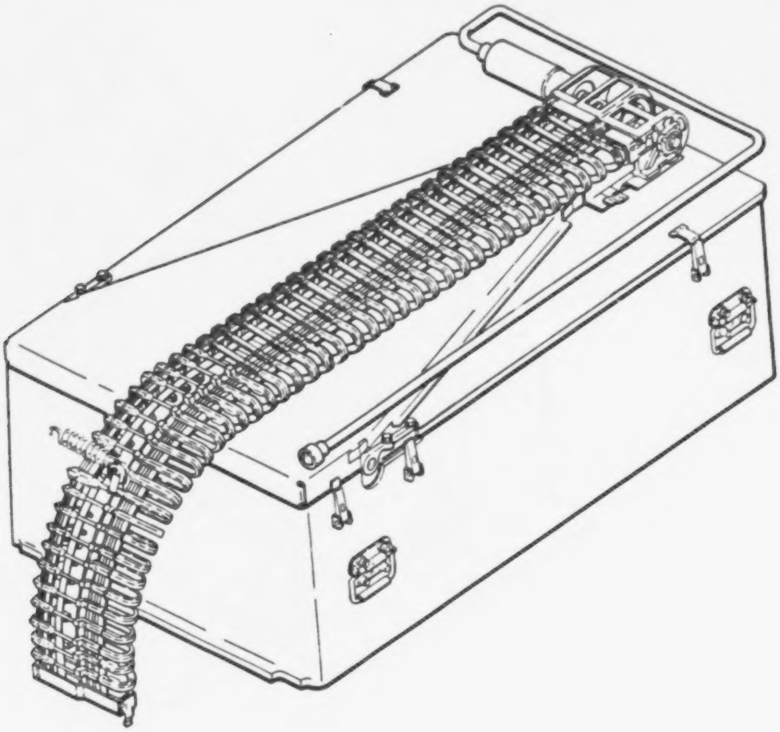
TURRET CONTROL UNIT



ARR82-27816

Power Requirements	28 (22 to 30) Vdc 200 amps, high level (HL) 2 amps, low level (LL) 115 ±5 V, 400±20 Hz, 95 VA (maximum) 26 ±5 V, 400 ±20 Hz
Weight	15.6 pounds
Height	5.16 inches
Width	10.16 inches
Length	12.72 inches

AMMUNITION FEED SYSTEM

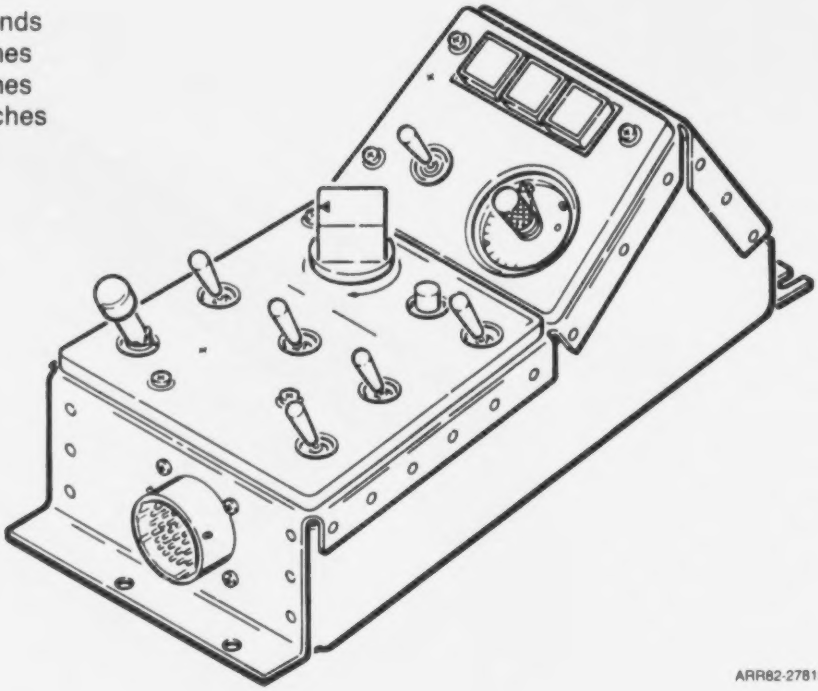


ARR82-27817

Capacity	750 rounds of linked 20-mm ammunition
Ammunition Box	
Weight	
Empty	93 pounds
Loaded	545 pounds
Height	18 inches
Width	26.5 inches
Length	44 inches
Booster	
Weight	8.5 pounds
Drive Motor	
Voltage	22.5 to 30 Vdc
Current	30 amps (maximum) at rated load
Feed Chute	
Weight	16 pounds
Height	3.5 inches
Width	7.5 inches
Length (extended)	90 inches

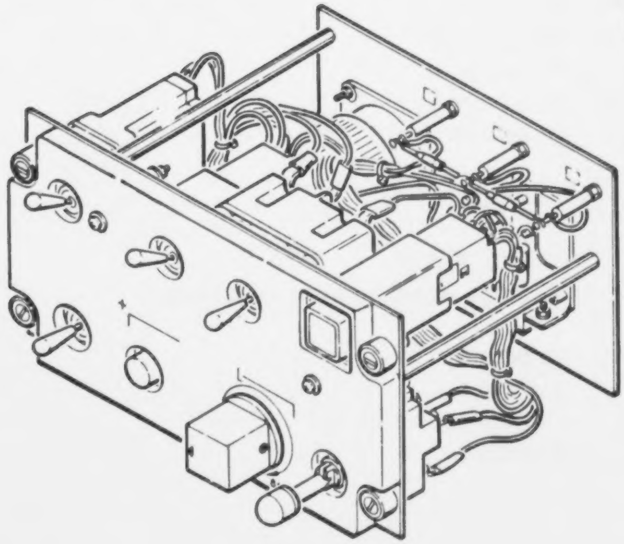
GUNNER ARMAMENT CONTROL PANEL

Weight	2.5 pounds
Height	3.8 inches
Width	4.8 inches
Length	10.9 inches


ARR82-27818

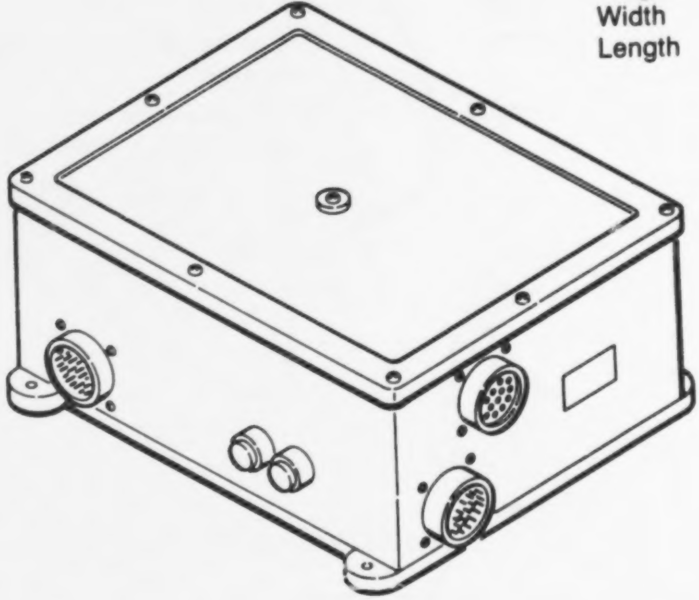
PILOT ARMAMENT CONTROL PANEL

Weight	1.5 pounds
Height	3.0 inches
Width	4.4 inches
Length	5.8 inches


ARR82-27819

INTERFACE CONTROL UNIT

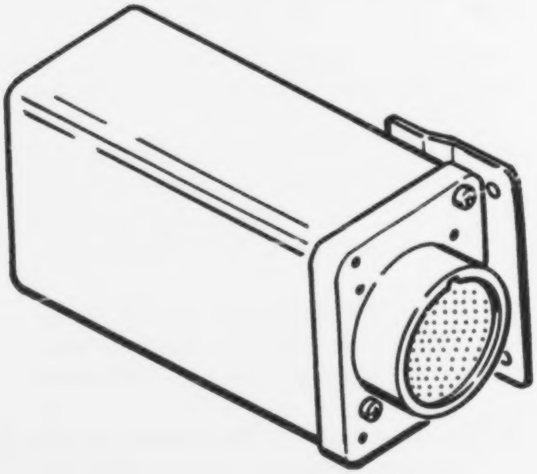
Power Requirements	28 Vdc 115 Vac
Weight	7 pounds
Height	4.6 inches
Width	9.4 inches
Length	10.4 inches



ARR82-27820

TURRET BUFFER AMPLIFIER

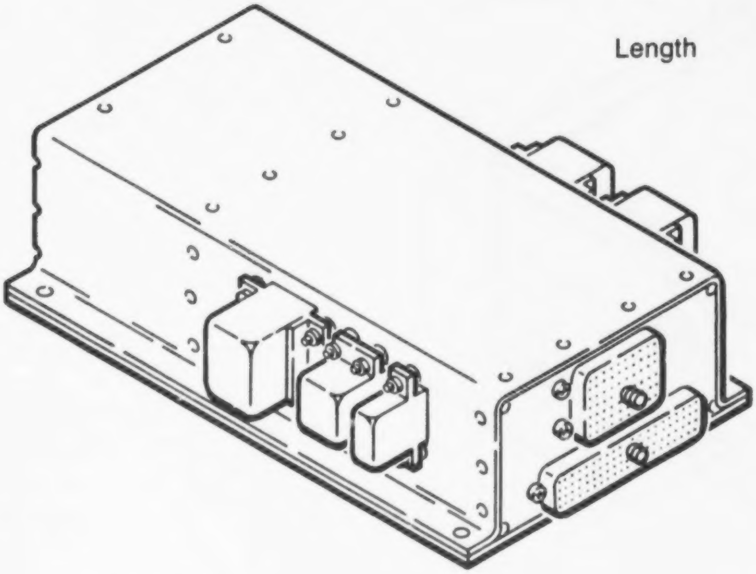
Power Requirements	115 Vac
Weight	0.9 pounds
Height	2.0 inches
Width	2.4 inches
Length	4.9 inches



ARR82-27821

LOGIC RELAY ASSEMBLY

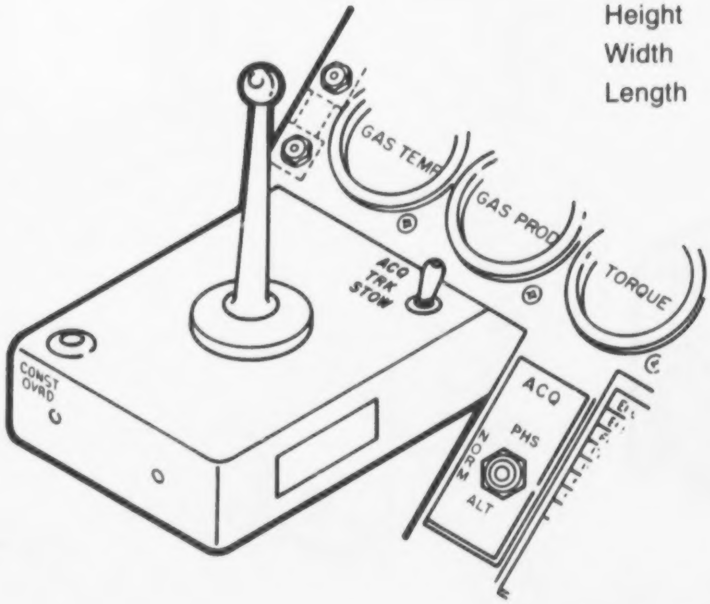
Power Requirements	Vdc (input)
Weight	5.6 pounds
Height	2.75 inches
Width	7.25 inches (total with relays installed)
Length	12.0 inches (total with connector bolt included)



ARR82-27822

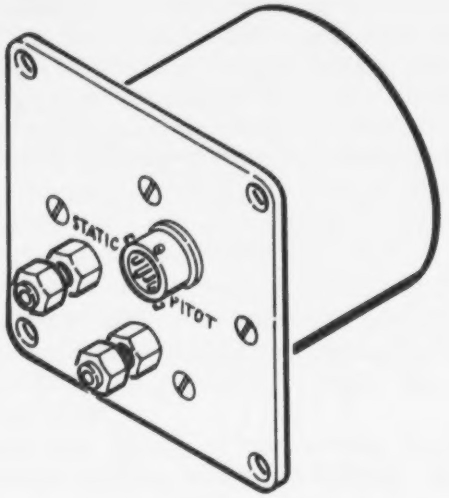
ACQUISITION SWITCH PANEL

Weight	0.5 ounce
Height	1.2 inches
Width	0.25 inch
Length	2.6 inches


GAS TEMP
GAS PROD
TORQUE
ACQ
TRK
STOW
CONST
OVRD
ACQ
PHS
NORM
ALT

ARR82-27823

AIRSPEED TRANSDUCER



Resistance	5K ± 250 ohms
Load	200 K ohms
Accuracy	
Air Speed	Tolerance
15 to 29 knots	+ 10 knots, - 15 knots
30 to 39 knots	± 10 knots
40 to 99 knots	± 5 knots
100 to 200 knots	± 3 knots
Temperature Range	- 67 °F (- 55 °C) to + 85 °F (+ 85 °C)
Weight	0.7 pound
Power Rating	0.20 watt

ARR82-27824

SAFETY, CARE, AND HANDLING

1-12. The armament/turret subsystem incorporates a number of safety features. The electrically-primed rounds are isolated from the firing circuit except when the turret subsystem is being fired. The armament/turret subsystem is quite resistant to radiation hazard (RADHAZ) disturbance. If the M14 links are equipped with RADHAZ tabs, the ammunition in the turret subsystem can be considered RADHAZ safe. The M197 gun is loaded and cleared in flight so that the helicopter may take off and land without live rounds in firing position. Observation of all safety precautions is MANDATORY at all times. The following general safety precautions are not related to any specific equipment or procedure and do not appear elsewhere in the manual. All concerned personnel must understand and apply these precautions during operation and maintenance of the equipment.

1. All personnel who supervise or perform work in connection with the handling of munitions will be familiar with the instructions and directives of the commands concerned.

2. All concerned personnel will become familiar with the armament/turret subsystem and support equipment before undertaking any operation or procedure. All concerned personnel will read the complete operation or procedure thoroughly before starting, to assure complete understanding by all involved.

3. All personnel must understand that observance of all safety precautions which apply to any specific equipment will be ineffective unless all safety precautions which apply to its related equipment are also observed at the same time.

4. Safety devices will always be used to minimize the possibility of accidents. Safety devices will be kept in good operating order.

Section III. PRINCIPLES OF OPERATION

Section Contents	Para
General	1-13
Functional Description	1-14

GENERAL

1-13. The turret subsystem is electrically operated and requires 28 Vdc and 115 V, 400 Hz power from the helicopter electrical system. Power to the turret subsystem is normally controlled by switches on the pilot AC armament circuit breaker panel.

The turret subsystem has three modes of operation: gunner in control, pilot in control, and pilot override. During gunner operation, the gunner directs the M197 gun using the TSU or HSS. During pilot operation, the pilot can either direct the M197 gun using the HSS or fire the M197 gun as a fixed position weapon using the HUD. During pilot override operation, a switch on the gunner armament control panel bypasses pilot control of turret subsystem power and operation, and the gunner directs the M197 gun using the HSS.

If normal turret subsystem operating power is lost or removed, for any reason, the emergency stow control unit will automatically position the M197 gun at the emergency stow position to permit the helicopter to be landed safely.

Electrical circuits in the TSU, HSS, turret control unit, and the turret permit remote control of the turret azimuth and elevation drive systems. The azimuth drive system positions the M197 gun over an azimuth range of 110° either side of 0° azimuth. The M197 gun can be depressed a maximum of 50° below 0° elevation. Elevation of the M197 gun above the horizontal varies with the azimuth position of the M197 gun. The variable upper elevation limit assures maximum gun elevation consistent with safe clearance of the helicopter rotor blades and structure. Mechanical stops prevent positioning the M197 gun beyond azimuth and elevation limits. Azimuth and elevation proximity switches remove power from the azimuth and elevation drive systems just before the turret reaches the mechanical stops. The proximity switches also disable circuits in the gun control unit to prevent the M197 gun from firing if the turret is at a positional limit.

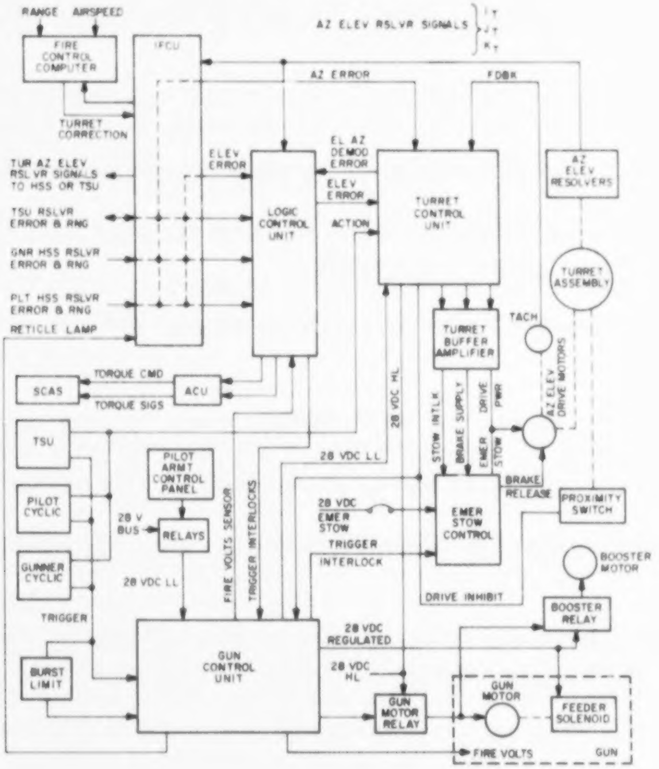
The gun control unit electrically controls the operation of the M197 gun, M89E1 feeder, and the ammunition feed system. If the turret is positioned within operational limits and is within 4.5° of the azimuth and elevation command signals, the gun control unit will apply power to the gun drive, M89E1 feeder, and booster when the trigger is depressed. The gun control unit also applies firing voltage to the M197 gun at the same time as gun drive power is applied.

The gun drive provides mechanical power to operate the M197 gun. Drive power is transmitted through the M197 gun to operate the M89E1 feeder. The feeder solenoid and booster motor are energized simultaneously to provide a smooth, controlled flow of ammunition from the ammunition box to the M89E1 feeder. The feeder solenoid engages the feeder declutching mechanism and linked ammunition is pulled into the M89E1 feeder, stripped from the links, and fed into the M197 gun. The empty links are ejected from the M89E1 feeder and directed out the bottom of the turret.

The M197 gun will fire a burst of 16 ± 4 rounds when the trigger switch is pressed to the first detent. When the trigger switch is pressed to the second detent, the M197 gun will fire a continuous burst at 730 ± 50 shots-per-minute. The flow of ammunition into the M197 gun is stopped immediately whenever the trigger is released. Time delay circuits in the gun control unit continue gun drive power and firing voltage to allow all rounds remaining in the M197 gun to be fired. If the turret activates any proximity switch, the trigger signal is interrupted, and the M197 gun will go into a clearing cycle. When the turret slews out of that limit, the M197 gun will resume firing. If the azimuth and elevation command signals lead the actual position of the turret, the trigger signal is interrupted, firing voltage is removed, and the M197 gun will go into a non-firing clearing cycle. When the turret position catches up with the commanded position, the M197 gun will resume firing. Electrical interlocks prevent firing rockets or TOW missiles when the turret is slewed more than 5° in azimuth. When the wing stores lockout circuitry is enabled, the turret will stow at zero degrees azimuth and elevation to preclude the possibility of gun fire detonating rockets or missiles in close proximity to the helicopter.

FUNCTIONAL DESCRIPTION

1-14. The turret subsystem consists of four major functional groups: pilot/gunner fire control; sight control; weapon control; and turret positioning. The function and relationship of these major groups are shown in a block diagram. Refer to Figure FO-1 for a schematic diagram of the turret. For a more detailed functional block diagram, see Figure FO-2.


RANGE
AIRSPEED
FIRE CONTROL COMPUTER
IFCU
AZ ELEV RSLVR SIGNALS
I_T
J_T
K_T
AZ ERROR
FDBK
TURRET CORRECTION
TUR AZ ELEV RSLVR SIGNALS TO HSS OR TSU
ELEV ERROR
EL AZ DEMOD ERROR
ELEV ERROR
ACTION
LOGIC CONTROL UNIT
TURRET CONTROL UNIT
AZ ELEV RESOLVERS
TSU RSLVR ERROR & RNG
GNR HSS RSLVR ERROR & RNG
PLT HSS RSLVR ERROR & RNG
RETICLE LAMP
TURRET ASSEMBLY
TACH
TURRET BUFFER AMPLIFIER
AZ ELEV DRIVE MOTORS
TORQUE CMD
TORQUE SIGS
SCAS
ACU
28 VDC HL
STOW INTLK
BRAKE SUPPLY
DRIVE
PWR
EMER STOW
TSU
PILOT ARMT CONTROL PANEL
28 VDC LL
BRAKE RELEASE
PROXIMITY SWITCH
PILOT CYCLIC
28 V BUS
RELAYS
FIRE VOLTS SENSOR
TRIGGER INTERLOCKS
28 VDC
EMER STOW
TRIGGER
INTERLOCK
EMER STOW CONTROL
GUNNER CYCLIC
28 VDC LL
BOOSTER MOTOR
DRIVE INHIBIT
TRIGGER
BOOSTER RELAY
28 VDC REGULATED
GUN CONTROL UNIT
28 VDC HL
BURST LIMIT
GUN MOTOR
GUN MOTOR RELAY
FEEDER SOLENOID
FIRE VOLTS
GUN

ARR82-27825

The pilot/gunner fire control provides the means to select the operator, either pilot or gunner, who will control the turret and who will fire the M197 gun. The sight control subsystem consists of the TSU, HSS, and the interface control unit. The sight control function permits the operator to acquire a target and to position the turret in azimuth and elevation relative to that target. Either the TSU or the HSS may be used to position the turret depending upon control switch selections available to the operator. The trigger signal from the mode-dependent trigger switch is applied to the gun control unit.

The gun control unit provides the circuits necessary to fire the M197 gun. The gun control unit also provides time delays, trigger interlocks, gun clearing, and some system-related power supplies. Some of the gun firing interlock circuits are provided by the logic control unit. The logic control unit contains the following fire interrupt logics: azimuth and elevation synchronization detectors; gunner stow interrupt; depression limit interrupt; out of coincidence; and interface control unit power supply failure interrupt. Burst limiting and simultaneous firing of the M197 gun and rockets is also provided by the gun control unit. Gun recoil induced helicopter attitude changes are minimized by circuits which interface with the helicopter stabilized control augmentation system (SCAS). The pitch, yaw, and roll torque signals are dependent upon turret position, and are utilized by the helicopter when a torque command signal is present.

The turret control unit circuits position the turret in fixed forward (0° azimuth, 0° elevation) and gunner stow (0° azimuth, 11° elevation) positions, and also in a track or flexible mode to the selected sight line-of-sight. The turret control unit also provides signals to the gun control unit to indicate an out-of-coincidence (weapon to sight) condition, weapon in depression limit, weapon in gunner stow, weapon in an azimuth or elevation limit, and a defect in the interface control unit. Whenever any of these indications are present, the M197 gun cannot be fired. The turret positioning circuits also include a backup provision to stow the turret in an upper forward position in the event of primary position control failure.

OPERATING MODES

The turret subsystem is functionally enabled in the following operating modes:

Gunner TSU. The gunner positions the turret and TSU with the sight hand control track control stick when WPN CONTR switch is placed to GUNNER.

Gunner HSS. The gunner positions the turret with his helmet sight when WPN CONTR switch is placed to GUNNER.

Pilot Override. The gunner places the PLT ORIDE switch on the gunner armament control panel to PLT ORIDE position to override the pilot in either PILOT or FIXED mode of the WPN CONTR switch. The gunner then takes control of the turret with his helmet sight.

Pilot HSS. The pilot positions the turret with his helmet sight when the WPN CONTR switch is placed to PILOT position.

Fixed. When the WPN CONTR switch is placed to FIXED position the M197 gun is fixed at 0° azimuth, 0° elevation and the pilot fires the M197 gun with his cyclic stick trigger.

NOTE

A description of the various armament configurations and firing modes are contained in TM 55-1520-236-10. A complete wiring diagram, showing interface between the turret subsystem and the helicopter power and control wiring is contained in TM 55-1520-236-23.

STANDBY MODE

Placing the MASTER ARM switch on the pilot armament control panel to STBY energizes standby relay K38. With standby relay K38 energized, 28 Vdc LL is applied from helicopter circuit breaker CB1 to the 28-volt regulated supply in the gun control unit. After a 2.2 to 5.5-second time delay, relay A4K2 in the gun control unit will energize if 115 Vac and 28 Vdc LL are present in the gun control unit. This time delay and voltage interlock is necessary to assure proper operation of the turret when turret power is applied. With helicopter TURRET PWR relay K7 energized, 28 Vdc HL is enabled to the turret control unit, gun drive motor, and booster motor. The turret may now be positioned, but not fired because the trigger circuits are disabled at this time. When the action switch is pressed, the turret is slaved to the TSU or HSS. When the action switch is released, the turret is automatically positioned to 0° azimuth, 11° elevation.

The FIXED mode on the WPN CONTR switch is used to command the turret to the 0° azimuth, 0° elevation position. This position is used by the pilot when he does not want to use his helmet sight to position the turret. This fixed mode can be used to position the M197 gun for use in a strafing attack when the MASTER ARM switch is placed in the ARM position. When the fixed mode is selected, relay A3A1K1 in the turret control unit is energized and the action (track) relays cannot be activated.

When the WPN CONTR switch is in GUNNER position, the gunner can use the TSU or his helmet sight for turret positioning. When the TOW control panel mode select switch is set to TSU/GUNS, the turret can be slaved to the TSU line-of-sight (LOS). All other TOW system modes would cause the PILOT'S HSS to direct the turret position. The GUNNER mode action switch is located on the TSU left-hand grip and is used to slave the turret to either the TSU or the HSS.

The PILOT mode allows the pilot to position the turret with his helmet sight. The turret is slaved to the helmet sight line-of-sight when the pilot cyclic stick action switch is pressed.

ARMED MODE

The turret subsystem has the same modes of operation as in the standby mode except that the trigger and firing circuits have been energized by the MASTER ARM switch. The trigger circuits are interlocked to the status conditions of the mode switches to prevent inadvertent firing of the M197 gun. The wing stores triggers cannot be utilized unless turret azimuth stow switch S3 is closed. This prevents firing rockets or TOW missiles if the M197 gun is at any position other than 0° azimuth. Burst limiting is controlled by the burst limit relay in the helicopter. The burst limit relay is energized when the selected trigger is pressed to the first detent. Contacts on the burst limit relay open and disconnect the burst limit signal from the input to the gun control unit. When the PLT ORIDE switch on the gunner armament control panel is placed in the PLT ORIDE position, the gunner positions the turret with his helmet sight. In this mode, the gunner uses the action and trigger switches on his cyclic stick and the TOW missile subsystem is interlocked to off.

TURRET POSITIONING

The turret is positioned by a directional cosine servo system. In other than gunner stow and fixed, positioning of the turret is initiated by the TSU or HSS. The positioning block consists of the following functional groups: sight resolvers, interface control unit, turret, servo amplifiers and motors, and emergency stow. The turret position resolvers are mechanically coupled to the saddle (elevation) and lower support (azimuth). The servo amplifier consists of azimuth and elevation servo amplifier circuits and servo motors, power amplifiers, and dc tachometer feedback loops. The emergency stow group consists of an elevation and azimuth drive in the emergency stow control unit and a turret power amplifier cutoff signal. The azimuth and elevation stow switches are mounted on the turret and are mechanically actuated.

The turret commanded position is dependent upon the position of the WPN CONTR switch. With the WPN CONTR switch set to FIXED, the turret will slew to the fixed forward position (0° azimuth, 0° elevation). In the FIXED position, fixed relay A3A1K1 is energized and inhibits action relays A3A1K3, K4, and K5. With the action relays deenergized, the sine of the turret azimuth resolver signal and the sine of the turret elevation resolver signal are applied to the respective azimuth and elevation servo amplifiers. The servo amplifiers then drive the turret to approximately 0° azimuth and 0° elevation to null the resolver signals. Thus, whenever fixed relay A3A1K1 is energized, the turret will position to 0° azimuth, 0° elevation.

When the WPN CONTR switch is set to GUNNER position, fixed relay A3A1K1 is deenergized. With relay A3A1K1 deenergized, the upper stow signal is applied to the elevation servo amplifier to drive the turret to 11° elevation (gunner stow). With the WPN CONTR switch set to GUNNER, the action relays are enabled and the turret can be commanded by the selected sighting mechanism.

Positioning the turret to a point of conversion consists of three steps: activating the turret subsystem; acquiring the target with the selected sighting mechanism; and tracking the turret to a point of conversion. The turret is activated by pressing the action switch. With the action switch pressed, 28 Vdc is applied to action relays A3A1K3, K4, and K5. When energized, relay A3A1K4 applies the azimuth error signal from the interface control unit to the variable main amplifier in the turret control unit, and relay A3A1K5 provides a path for the elevation error signal from the logic control unit to the elevation servo amplifier. With the action relays energized, the servo drive circuits are enabled and the positioning resolver applies the proper signals to position the turret to a point of conversion.

Acquisition of a target with the selected sight can also be accomplished prior to closing the action relays. As a sight is moved in azimuth and elevation, the sight resolver rotors are rotationally displaced from their respective stators and generate error signals which are applied to the appropriate servo amplifier. The servo amplifier then moves the turret in the direction to null the error. The turret signals, which excite the sight resolvers, null the error by changing phase and amplitude according to turret position. Thus, the position to which sight was moved is duplicated by the turret. The elevation error signal is applied to the turret control unit through depression limit circuitry in the logic control unit. When the depression limit switch on the gunner armament control panel is in the TURRET DEPR LIMIT position, 28 Vdc is applied through deenergized fixed relay A3A1K1 to the logic control unit. Turret depression is then limited to −5° to prevent driving the gun barrels into the ground.

When the turret is in the FIXED mode, the prime error signal is from the sine winding of the respective turret resolver. Therefore if the turret is not at zero, an error signal will be developed to move the turret to zero. The stow offset signal is a secondary input available to the servo amplifiers. This signal provides a maximum position control of ±2° to allow boresighting in the fixed mode without adjustment of the turret resolvers. Adjustment of the stow offset potentiometers in the turret control unit will aline the turret. In the gunner stow mode, the fixed elevation stow voltage is equivalent to +11° and the azimuth stow input is shorted to ground.

The azimuth and elevation servo amplifiers are functionally similar. The azimuth servo amplifier determines, by error signal phase, the direction in which the turret will be driven. As the turret moves, a tachometer feedback signal is developed and applied to the azimuth servo amplifier. Both tachometer feedback signals, azimuth and elevation, perform two functions. One function is slew velocity limiting to keep the turret from driving too fast. The second function is a reverse drive signal which is provided to the servo amplifier when the turret position is within 4.5° of the point of conversion. This last function provides a damping effect to stop the turret from over-driving the point of conversion and also to prevent oscillation of the turret. When the turret reaches the point of conversion, both error signals are at a zero voltage level and the turret stops driving. When the turret stops driving, the tachometer feedback signal drops to a zero voltage level. As long as the sights are not moved, the turret will remain in that position.

When the action switches are released, the action relays are deenergized and gunner stow positioning signals are applied to the azimuth and elevation servo amplifiers. The servo amplifiers then drive the turret to the gunner stow position. The azimuth and elevation proximity switches, which are mounted on the turret, provide safe positioning of the turret. When the turret is slewed into a limit (left, right, up, or down), a limit signal from the applicable proximity switch is applied to the gun control unit to prohibit the M197 gun from firing. The limit signal is also applied to the applicable servo amplifier to prohibit the drive circuit from continuing to drive in that direction. Whenever the turret lags the sight command by more than 4.5°, the logic control unit provides a coincidence signal to the gun control unit to prohibit the M197 gun from firing.

The emergency stow control unit provides the capability to stow the turret in an emergency stow position (approximate gunner stow). The emergency stow control unit also provides the capability to stow the turret safely when power to, or within, the turret subsystem is low or faulty. When emergency stow is initiated, the turret will drive to at least 10° elevation and to approximately 0° azimuth. When all the electrical power required for turret subsystem operation is applied to the turret subsystem, 28 Vdc emergency stow power is inhibited. When one or more of the monitored power supplies are faulty, the following events occur: power to the elevation and azimuth brakes is routed via the respective stow switches; the turret control unit circuits are inhibited; and the elevation stow circuit supplies power to the elevation drive motor. This drives the turret to the upper stow position.

When the turret reaches the upper stow position, the elevation stow switch inhibits power to the elevation drive and brake. This locks the turret in the elevation stow position. When the elevation stow switch is activated, 28 Vdc emergency stow power is routed through the azimuth stow switch to the azimuth brake. This enables the azimuth drive in the emergency stow control unit to position the turret to 0° azimuth. The azimuth stow switch is a three-deck cam switch. One switch is open when the turret is out of the 0° azimuth position. The other two switches are open or closed depending on whether the turret is positioned to the left or right of 0° azimuth. If the turret is positioned left of 0°, the emergency stow control unit will cause the turret to slew right to 0° and stop. At this time azimuth brake power is inhibited to lock the turret in azimuth. When the turret is not in 0° azimuth, azimuth stow switch S3 is opened to inhibit wing stores from firing.

The logic control unit coincidence circuits monitor either the TSU or HSS resolver signals. This action provides indications to the gun control unit that the turret is alined to the sight and that the total resolver system is functional. If coincidence between the sight and turret resolvers exceed 4.5° or if a resolver failure occurs, gun firing will be interrupted. In addition, the interface control unit provides positive and negative 18 Vdc interlock voltages. Failure of either voltage will open the Q inputs to the coincidence circuits.

The fire control computer provides continuous gun directing command signals proportional to the ballistic prediction angle, including compensation for effects of range, air density, helicopter pitch and roll, total velocity, rotor downwash, weather vaning and time-of-flight. The fire control computer provides inputs for compensation or alinement to the servo loop through the interface control unit buffers. The computer inputs are parallel to the loop. If the fire control computer fails, the interface control unit bypasses the fire control computer and ties the sights directly to the weapon.

WEAPON CONTROL

The M197 gun is controlled by four functional groups: trigger logic, fire volts, gun drive motor circuits, and feeder and booster drive circuits. The trigger logic consists of a burst limit circuit, a rocket lockout circuit, a reticle flasher circuit, and the trigger enable gates circuitry. The trigger logic circuitry provides the safe-to-fire logic and will prohibit the M197 gun from firing when specified conditions are not met. The fire volts circuitry consists of a fire volts time delay, the fire volts lockout gates, a fire volts power supply, and the fire volts sensor. The fire volts circuitry provides 320 Vdc to electrically fire the primer of the rounds, interrupts the fire volts when certain conditions are not met, and provides the logic control unit torque command circuitry with a signal which interlocks the torque command to the helicopter SCAS system. The gun drive delay relay (gun drive motor) circuit provides a time delay for gun clearing. The feeder and booster drive circuit consists of a relay driver which energizes the feeder solenoid and booster motor.

The trigger logic circuits consist of six AND gates, a rocket lockout time delay, a burst limiter circuit, and a reticle flasher circuit. The six AND gates receive their inputs from the four turret limit switches and the turret positioning azimuth and elevation coincidence signals. When the turret system activates any turret proximity switch, the trigger signal is interrupted and the M197 gun goes into clearing. When the turret slews out of that limit, the trigger signal is enabled and the M197 gun starts firing. The azimuth and/or elevation error gate signals occur when a sight position command leads the actual turret position by 4.5° or a resolver failure occurs. When this occurs, the trigger signal is inhibited and the M197 gun goes into a non-firing clearing cycle. When the turret position catches up with the sight commanded position (less than 4.5°), the M197 gun will resume firing.

When the turret subsystem is in a firing condition, the sight reticle lamp is constantly illuminated. When the trigger signal is interrupted, a trigger lockout signal is applied to the reticle flasher circuit. When enabled, the reticle flasher circuit causes the sight reticle lamp to blink on and off. The flashing reticle lamp indicates the gun firing circuits are inhibited. When the trigger signal is again enabled, the reticle lamp stops flashing.

With trigger applied and interlock conditions good, the trigger signal is applied to the fire volts time delay, feeder/booster relay driver, and the gun motor time delay circuits. The fire volts and gun motor time delays are activated when the trigger is released or when the trigger signal is interrupted. The fire volts time delay and the fire volts lockout route the trigger signal to the fire volts relay. With this signal applied, the fire volts relay is energized and 320 Vdc is applied to the M197 gun. Each time a round is fired, the drop in voltage level provides a pulse to the sensor circuit. The sensor circuit detects the pulse and applies a signal to the logic control unit to indicate that the M197 gun is firing. The gun motor time delay energizes gun motor relay K5. With K5 energized, 28 Vdc is applied to the gun drive motor, feeder solenoid, and the booster motor. As the M197 gun fires, a rounds count pulse from the rounds sensing switch on the M89E1 feeder is applied to the rounds remaining indicator on the gunner armament control panel and to the rounds totalizer on the turret.

When the trigger is released, the gun control circuitry initiates the clearing cycle. The feeder and booster motor relays are deenergized when the trigger is released to prevent rounds from being fed into the M197 gun. Approximately 650 milliseconds after the trigger is released, the gun motor time delay will inhibit the gun drive. Approximately 1.5 seconds after the trigger is released, the fire volts time delay will inhibit fire volts. Since the gun drive will continue to operate for approximately 650 milliseconds after the feeder solenoid is deenergized, all rounds in the M197 gun at the start of the clearing cycle (approximately two to four) will be fired out.

When the trigger switch is depressed to the first detent, these same events will occur after 16 ± 4 rounds have been fired. The burst limit circuit causes the trigger logic circuit to inhibit the trigger signal approximately 1.5 seconds after the trigger is pressed. This causes the M197 gun to fire about 16 ± 4 rounds. The rocket lockout signal can only be applied with the turret in the azimuth stow position. With the rocket lockout signal applied, the lockout time delay inhibits the trigger signal. When rocket lockout signal is removed, the lockout time delay will continue to inhibit the trigger signal for approximately 1 ± 0.5 seconds to assure safe firing of wing stores.

CHAPTER 2

GROUND CREW OPERATIONAL INSTRUCTIONS

CHAPTER CONTENTS

		Page
Section I	Service Upon Receipt	2-1
Section II	Operational Checks and Services	2-2

Section I. SERVICE UPON RECEIPT

Section Contents	Para
General	2-1
Inspection, Service, and Setup Instructions	2-2

GENERAL

2-1. When a new or reconditioned turret subsystem is received, the using organization must determine that the subsystem is complete; that the subsystem has been properly prepared for service by the preparing activity; and if the subsystem is capable of performing its mission. For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit, SC 5180-95-CL-B09 and SC 5180-95-CL-B10.

INSPECTION, SERVICE, AND SETUP INSTRUCTIONS

2-2. The turret subsystem will be functionally checked out completely with the aid of the Electronics Systems Test Set M137, lubricated in accordance with chapter 3, and operationally checked out by performing a preoperational check. Then, weapon baseline to sight optics will be verified by performing a quick check boresight to determine whether or not the turret subsystem must be boresighted. Inboard rocket launchers (if installed) will be checked by performing a quick check rocket launcher alinement procedure.

Section II. OPERATIONAL CHECKS AND SERVICES

Section Contents

	Para
General	2-3
Safing Inspection	2-4
Downloading Ammunition	2-5
Helicopter Armament Subsystem Maintenance Setup	2-6
Electrical Power Application/Removal	2-7
Turret Subsystem Preoperational Check	2-8
Quick Check Boresight	2-9
Rocket Launcher Alinement	2-10
Loading Ammunition	2-11

WARNING

Make sure that the turret system, the rockets, and the TOW missile launchers are downloaded and that no live rounds remain in gun or feeder before performing any checks or procedures.

GENERAL

2-3. This section contains operational checks and services which determine preflight, prefire, and postflight condition of the armament subsystem; also included are instructions for premaintenance, postmaintenance, and loading and unloading. The checks and services in this section are all given in task format. In addition, to the task coverage statement in each task, the following provides a brief description of each task, including suggestions for applications:

SAFING INSPECTION

This task contains instructions for determining whether or not the M197 gun and M89E1 feeder are clear of live rounds. This task is to be used whenever live ammunition is loaded in the turret subsystem and personnel are required to perform maintenance or services. This task contains a long list of general safety instructions which shall be carefully observed. The turret subsystem is not considered in a safed condition until the M197 gun and M89E1 feeder are clear; and all ammunition has been downloaded from the ammunition feed system. The SAFING INSPECTION is the only task in the manual which does not require that the HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP be performed, therefore, it is the responsibility of the pilot and co-pilot to make sure all armament switches and circuit breakers are in a safe condition. If the cockpits are empty, verify that the armament switches and circuit breakers are in a safe position.

DOWNLOADING AMMUNITION

This task covers downloading of 20-mm ammunition and requires the SAFING INSPECTION be performed before starting. DOWNLOADING AMMUNITION is the only task which allows the HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP to be performed with ammunition aboard. The DOWNLOADING AMMUNITION task provides two methods for downloading ammunition depending on how many rounds are remaining.

HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP

This task is a prerequisite for all tasks in the manual except the SAFING INSPECTION. This task contains many conditions which shall be met when performing maintenance. Many of the conditions are safety related and must not be overlooked or taken for granted. This task sets switches and circuit breakers in a known condition, which is necessary for troubleshooting, testing, as well as, maintenance. This task is done before performing any maintenance action and is the last step of removing power, therefore, the helicopter should always be in this condition except when actual maintenance is being performed. The last steps in this task manually position the turret. This allows the technicians to verify the gun swing area is clear and also to see if the turret drive trains are operating smoothly prior to applying power.

ELECTRICAL POWER APPLICATION/REMOVAL

This task is used to apply and remove auxiliary electrical power. Note that the last step of POWER REMOVAL requires that the HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP be performed.

TURRET SUBSYSTEM PREOPERATIONAL CHECK

This task checks the basic operational status of the turret subsystem and its interaction with the remaining subsystem components. This task verifies the weapon will fire when commanded during flight and that all operational modes are functional. Specific details such as pointing accuracy, SCAS corrections, range compensation, etc. are not verified. In order to check these functions see the specific test or task where they are covered. This check should be used prior to flight, but also will be a valuable aid at any point in the maintenance process to verify or identify operational status.

QUICK CHECK BORESIGHT

This task provides a quick method of verifying the general pointing accuracy of the turret subsystem in relation to the sight systems commanding it. It is not a substitute for complete system boresighting.

ROCKET LAUNCHER ALINEMENT

This task provides a quick check and alinement procedure to set inboard rocket launchers in pitch and yaw. The TSU boresight device is used as reference to set the pitch of the launchers to 71.1 ± 8 mils nose up attitude. Yaw alinement is accomplished by adjusting the launchers to be parallel with the aircraft.

LOADING AMMUNITION

This task covers loading full and partial complements of 20-mm ammunition. The task also provides instructions on linking and delinking ammunition, joining lengths of linked ammunition, inspecting linked ammunition, and how to perform a free hinging test on linked ammunition.

2-4. SAFING INSPECTION

DESCRIPTION

This task covers: Safing inspection.

INITIAL SETUP

Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental
  M25 Linker-Delinker
  Heat Protective Mittens

References:
  TM 9-1055-460-13&P
  TM 9-1425-473-20

Personnel Required:
  Ground Crew

Equipment Conditions:
  Helicopter positioned in designated disarming/safing area.
  All wing stores weapons systems unloaded, see TM 9-1055-460-13&P and TM 9-1425-473-20.

WARNING

DANGER
laser light

The laser beam is dangerous and can cause blindness if it enters the eye either directly or if reflected from a shiny surface. Laser light leakage due to improper mounting of the TSU window cover may cause injury to the eye.

WARNING

All jettison safety pins shall be installed when the helicopter is on the ground and while maintenance is being performed. Serious injury could result from accidental jettison. Safety pins shall be removed before flight so emergency jettison of wing stores can be accomplished.

Gun barrels may be hot. Use heat protective mittens when handling hot barrels.

Cook off may occur when live ammunition is chambered in hot weapons. A 20-minute cool down of the weapon should be observed from the time stoppage occurs.

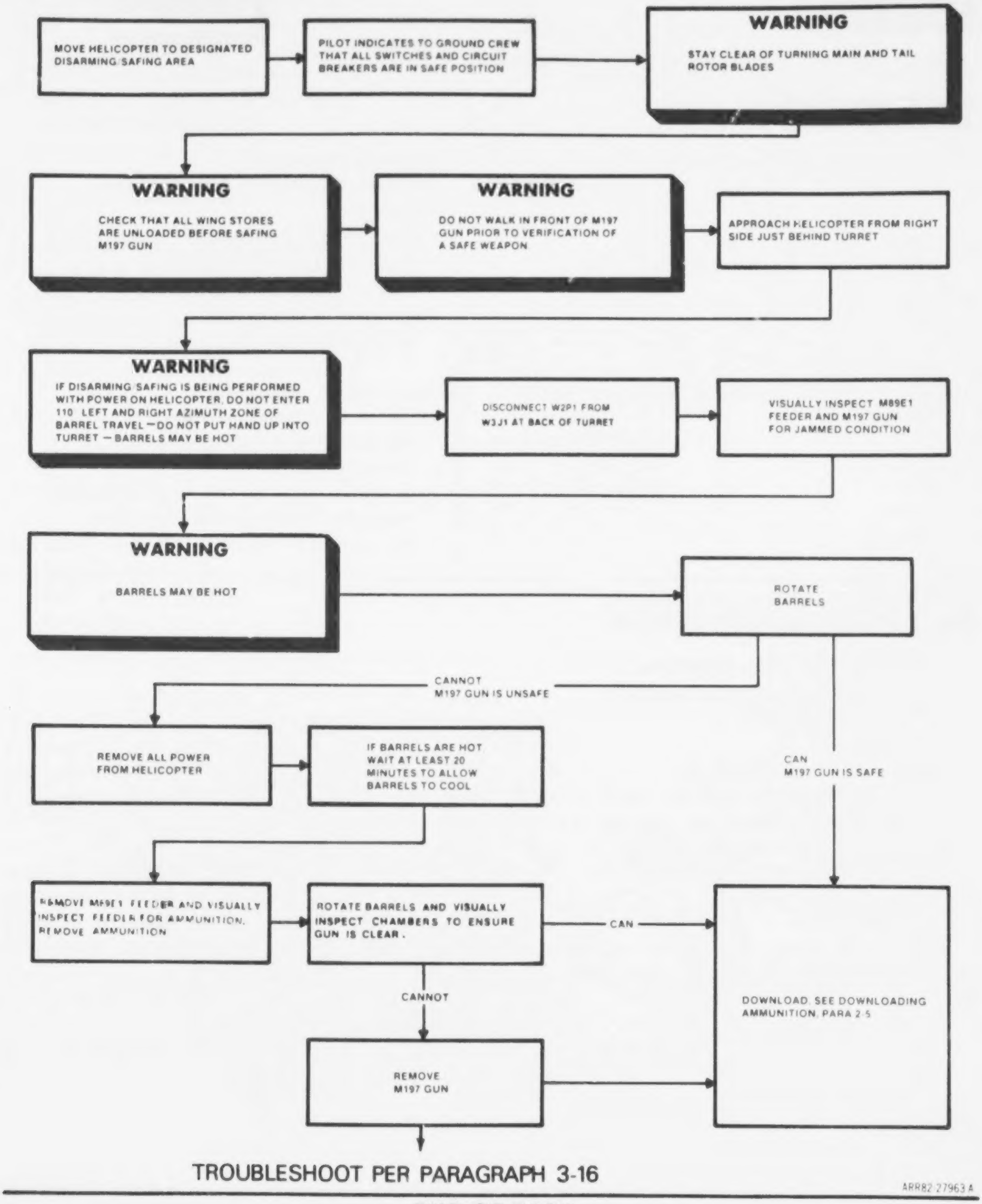
Keep fingers and foreign material clear of feed chute, M197 gun, and M89E1 feeder.

Hearing protection such as ear plugs must be used by all personnel in and around the helicopter during its operation.

Observe all precautions governing care and handling of live ammunition.

Interruption of power to the armament system, for example because of accidentally switching off the MASTER ARM, results in the gun going to stow at the rate of 80 degrees per second. This could cause injury to personnel or damage to equipment.

SAFING INSPECTION


MOVE HELICOPTER TO DESIGNATED DISARMING/SAFING AREA
PILOT INDICATES TO GROUND CREW THAT ALL SWITCHES AND CIRCUIT BREAKERS ARE IN SAFE POSITION
WARNING
STAY CLEAR OF TURNING MAIN AND TAIL ROTOR BLADES
WARNING
CHECK THAT ALL WING STORES ARE UNLOADED BEFORE SAFING M197 GUN
WARNING
DO NOT WALK IN FRONT OF M197 GUN PRIOR TO VERIFICATION OF A SAFE WEAPON
APPROACH HELICOPTER FROM RIGHT SIDE JUST BEHIND TURRET
WARNING
IF DISARMING/SAFING IS BEING PERFORMED WITH POWER ON HELICOPTER, DO NOT ENTER 110 LEFT AND RIGHT AZIMUTH ZONE OF BARREL TRAVEL — DO NOT PUT HAND UP INTO TURRET — BARRELS MAY BE HOT
DISCONNECT W2P1 FROM W3J1 AT BACK OF TURRET
VISUALLY INSPECT M89E1 FEEDER AND M197 GUN FOR JAMMED CONDITION
WARNING
BARRELS MAY BE HOT
ROTATE BARRELS
CANNOT
M197 GUN IS UNSAFE
CAN
M197 GUN IS SAFE
REMOVE ALL POWER FROM HELICOPTER
IF BARRELS ARE HOT WAIT AT LEAST 20 MINUTES TO ALLOW BARRELS TO COOL
REMOVE M89E1 FEEDER AND VISUALLY INSPECT FEEDER FOR AMMUNITION. REMOVE AMMUNITION
ROTATE BARRELS AND VISUALLY INSPECT CHAMBERS TO ENSURE GUN IS CLEAR.
CAN
CANNOT
DOWNLOAD. SEE DOWNLOADING AMMUNITION, PARA 2-5
REMOVE M197 GUN
TROUBLESHOOT PER PARAGRAPH 3-16

ARR82-27963 A

END OF TASK

2-5. DOWNLOADING AMMUNITION

DESCRIPTION

This task covers: Downloading 20-mm ammunition.

INITIAL SETUP

Tools/Test and Support Equipment:
- Tool Set, A/C Armament Repairman: Basic
- Tool Set, A/C Armament Repairman: Supplemental
- M25 Linker-Delinker
- Heat Protective Mittens

Personnel Required:
- 68M Aircraft Weapon Systems Repairer (3)

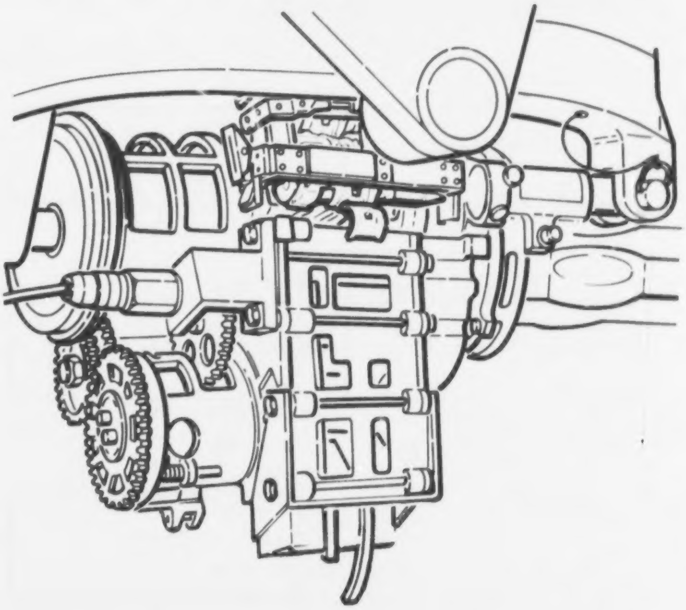
Equipment Conditions:
- SAFING INSPECTION performed, para 2-4.
- HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP performed, para 2-6.
- Helicopter in designated loading/downloading area.

General Safety Instructions:
- Observe all precautions governing care and handling of live ammunition.
- Gun barrels may be hot. Use heat protective mittens when handling hot barrels.

DOWNLOADING AMMUNITION

1. REMOVE FEED CHUTE FROM M89E1 FEEDER AND BREAK LINKED AMMUNITION AT FEED CHUTE.

2. IF RD RMNG INDICATOR ON GUNNER ARMAMENT CONTROL PANEL INDICATES 100 ROUNDS OR LESS, GO TO NEXT STEP. IF INDICATOR INDICATES MORE THAN 100 ROUNDS GO TO STEP 7.



DOWNLOADING AMMUNITION (cont)

WARNING

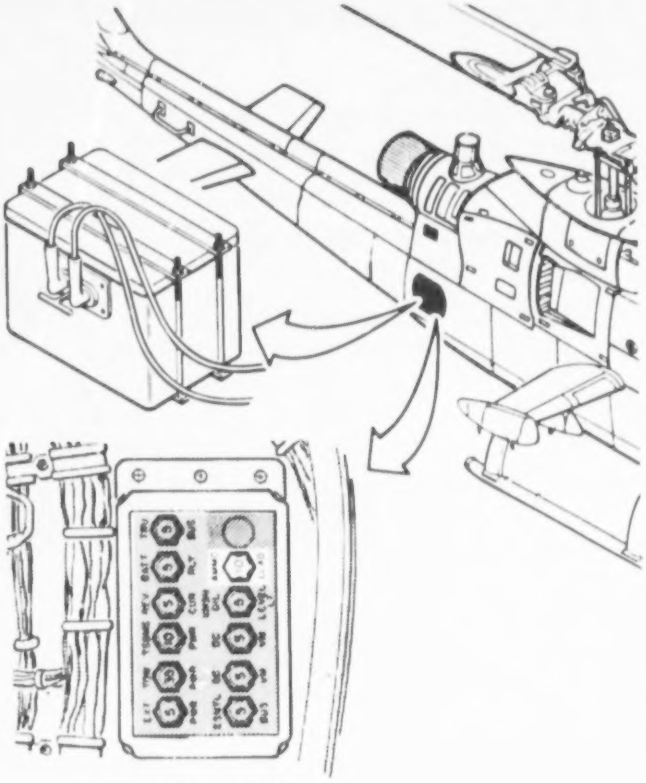
Warn people working on or near helicopter before applying electrical power.

CAUTION

Minimum acceptable battery voltage is 22.0 Vdc. If battery voltage is below 22.0 Vdc the battery must be replaced before applying electrical power. See TM 55-1520-236-23. Low battery voltage may cause damage to battery.

3. CONNECT BATTERY.

3.1 CHECK THAT AMMO LOAD CIRCUIT BREAKER ON BATTERY COMPARTMENT IS CLOSED.



CIRCUIT BREAKER PANEL

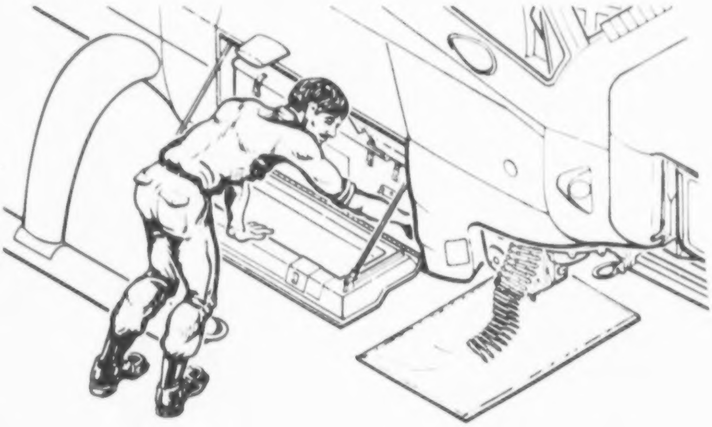
WARNING

Keep fingers and foreign material clear of feed chute, M197 gun, and M89E1 feeder.

4. USING AMMO LOAD SWITCH JOB LINKED AMMUNITION OUT OF AMMUNITION BOX. DO NOT ALLOW LINKED AMMUNITION TO DROP ON GROUND.

5. DISCONNECT BATTERY.

6. GO TO STEP 12.



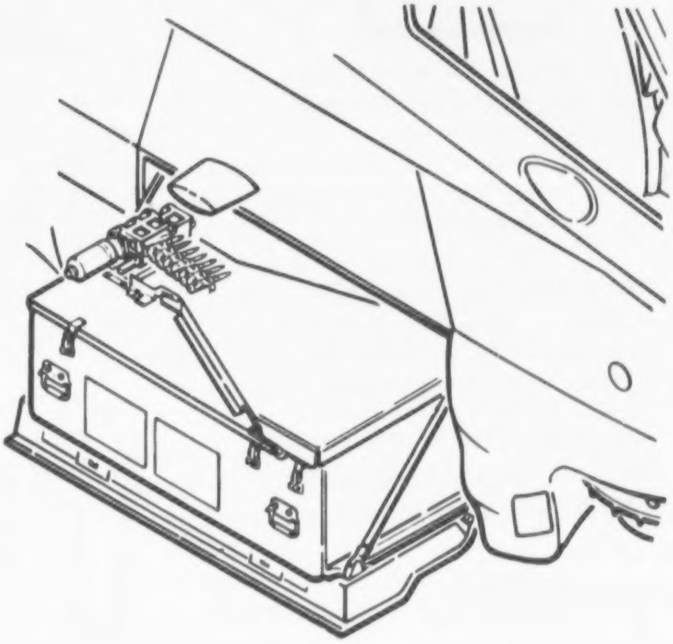
2-5. DOWNLOADING AMMUNITION (cont)

DOWNLOADING AMMUNITION (cont)

7. REMOVE CABLE W1 FROM BOOSTER MOTOR AND AIRCRAFT CONNECTOR.

8. REMOVE TWO PINS FROM AMMUNITION BAY TRACK ON RIGHT SIDE.

   Place pins so they will not interfere with ammunition box sliding in tracks.



ARR82 28021

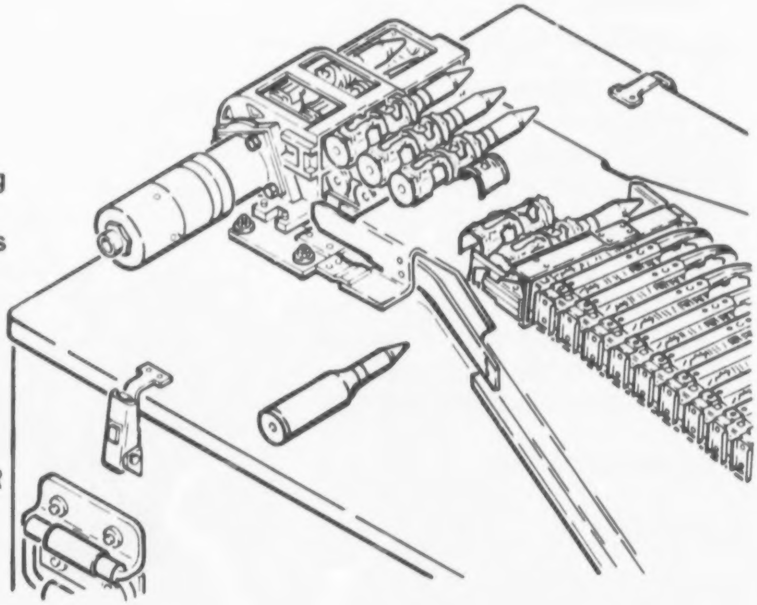
WARNING

Exercise care when performing the following step. A fully loaded ammunition box weighs approximately 500 pounds.

9. REMOVE AMMUNITION BOX.

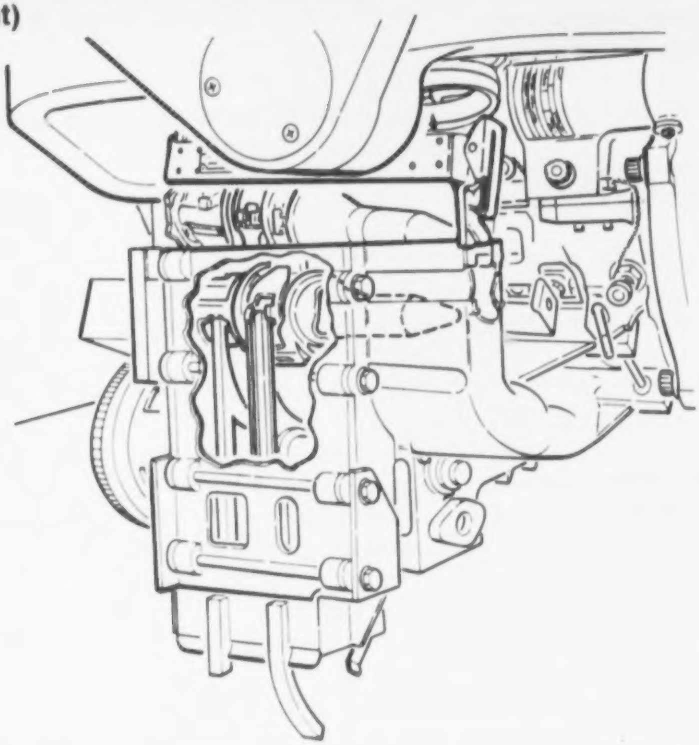
10. REMOVE FEED CHUTE FROM BOOSTER MOTOR AND BREAK LINKED AMMUNITION.

11. CLEAR FEED CHUTE BY REMOVING REMAINING ROUNDS FROM FEEDER END.



DOWNLOADING AMMUNITION (cont)

12. CHECK THAT LEADING LINK IN M89E1 FEEDER IS PROPERLY POSITIONED ON T-BAR GUIDE RAIL.



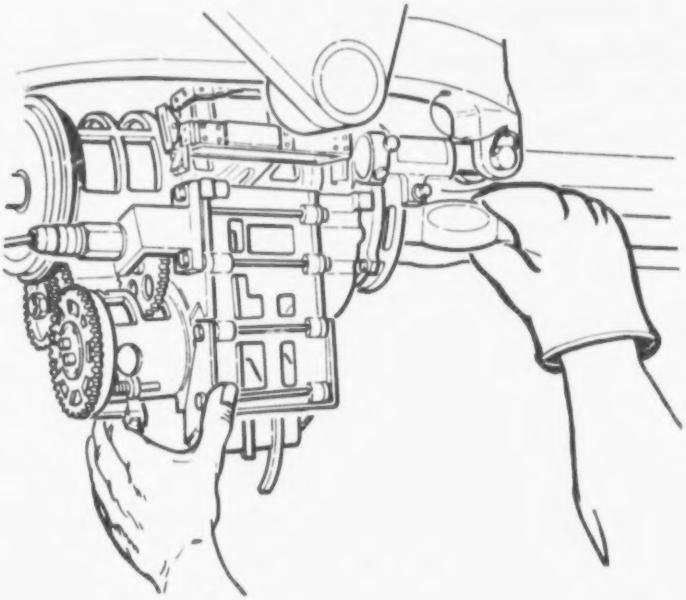
ARR82-28029

WARNING

Gun barrels may be hot.

13. DEPRESS FEEDER SOLENOID AND MANUALLY ROTATE BARREL CLUSTER UNTIL ALL ROUNDS HAVE BEEN EJECTED FROM M197 GUN AND ALL LINKS ARE CLEAR OF M89E1 FEEDER.

14. CONNECT FEED CHUTE TO M89E1 FEEDER.



ARR82-28030

END OF TASK

2-6. HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP

DESCRIPTION

This task covers: Helicopter setup conditions prior to armament subsystems maintenance, testing, alinement or boresighting.

INITIAL SETUP

Personnel Required: (1)
68J Aircraft Fire Control Repairer/
68M Aircraft Weapon Systems Repairer

References:
TM 55-1520-236-10

Equipment Conditions:
Helicopter and surrounding area inspected for and cleared of all foreign objects.
Helicopter parked on level surface.
Gun safed and safety barrier erected around gun swing area.
M197 gun properly timed and in stow position.
Battery compartment panel removed.
Left and/or right ammunition bay doors open as necessary.
Pilot and gunner cockpit doors open.
Helicopter electrically grounded.
Ground safety pins installed in pilot and gunner canopy removal arming/firing mechanisms.
All wing stores jettison safety pins installed.
Azimuth indicator rod removed as necessary to prevent damage during maintenance.
Night vision feature deactivated in both cockpits, see TM 55-1520-236-10.

General Safety Instructions:

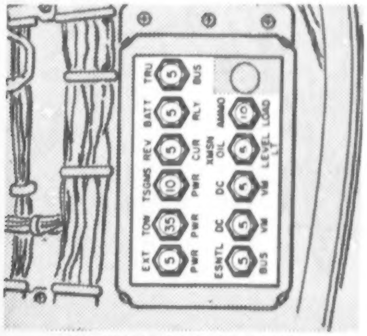
NOTE

20-mm ammunition allowed only when performing downloading.

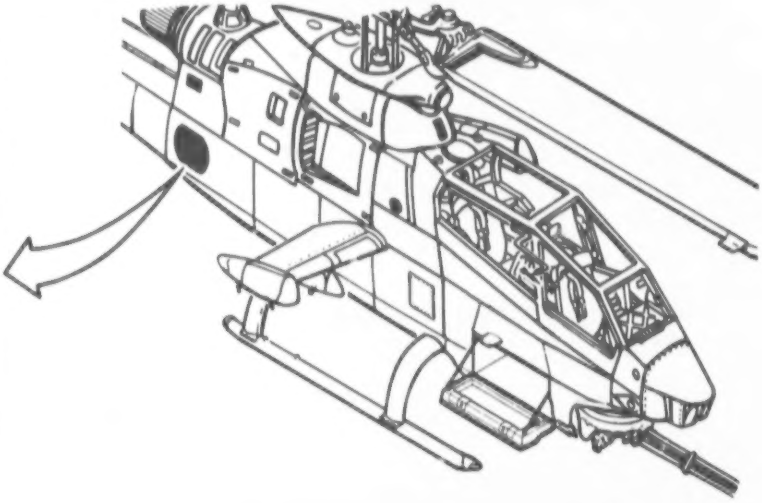
No ammunition or explosive ordnance in any aircraft weapon system.
All wing stores weapon systems unloaded.
Gun swing area cleared and personnel warned to remain outside gun swing area.

HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP

1. OPEN ALL CIRCUIT BREAKERS ON CIRCUIT BREAKER PANEL IN BATTERY COMPARTMENT.



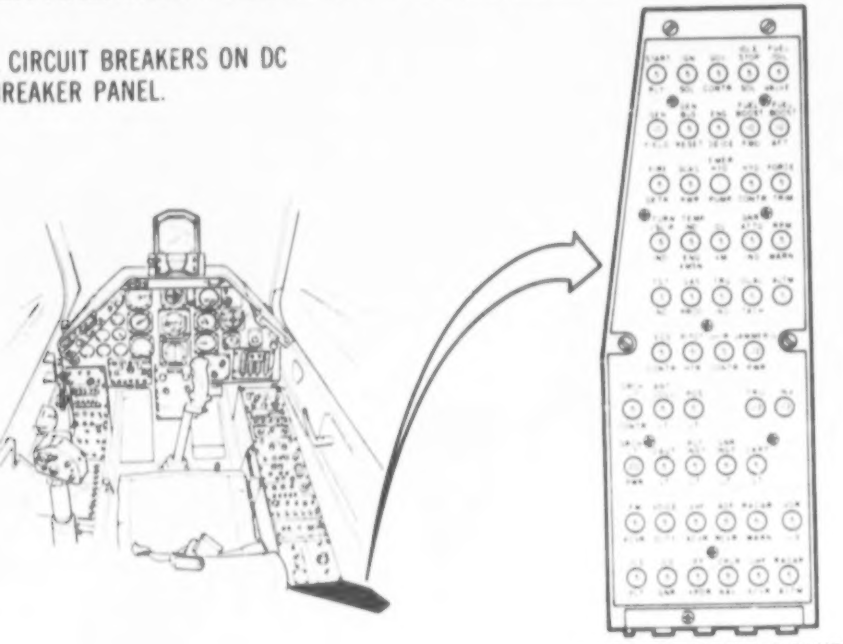
CIRCUIT BREAKER PANEL



ARR82 25468

HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP (cont)

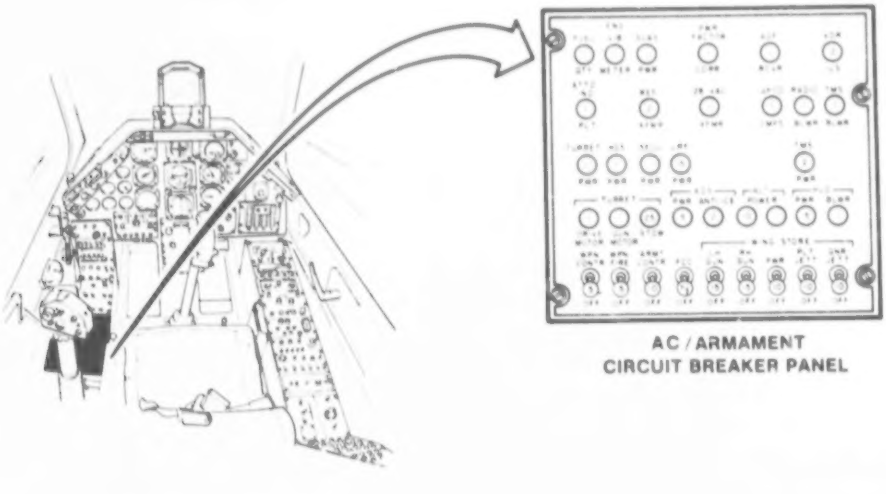
2. OPEN ALL CIRCUIT BREAKERS ON DC CIRCUIT BREAKER PANEL.



DC CIRCUIT BREAKER PANEL

ARR82 25469

3. OPEN ALL CIRCUIT BREAKERS ON AC/ARMAMENT CIRCUIT BREAKER PANEL.


METER
PWR
TURRET
WING STORE
OFF

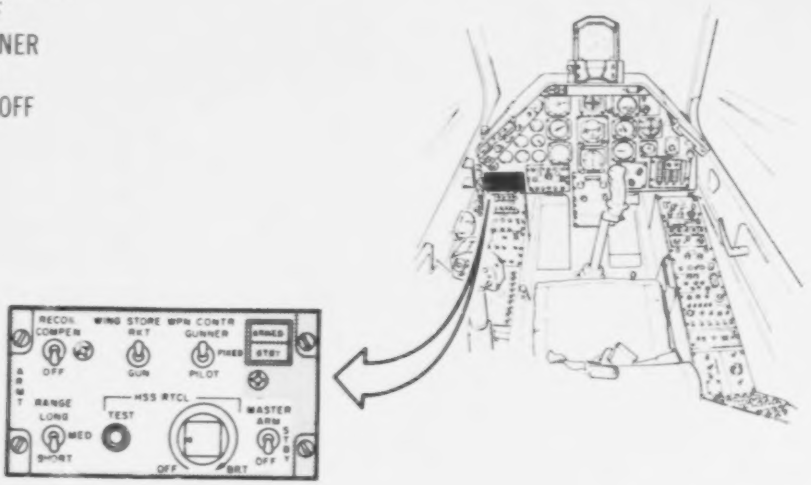
AC / ARMAMENT
CIRCUIT BREAKER PANEL

ARR82 25470

2-6. HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP (cont)

HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP (cont)

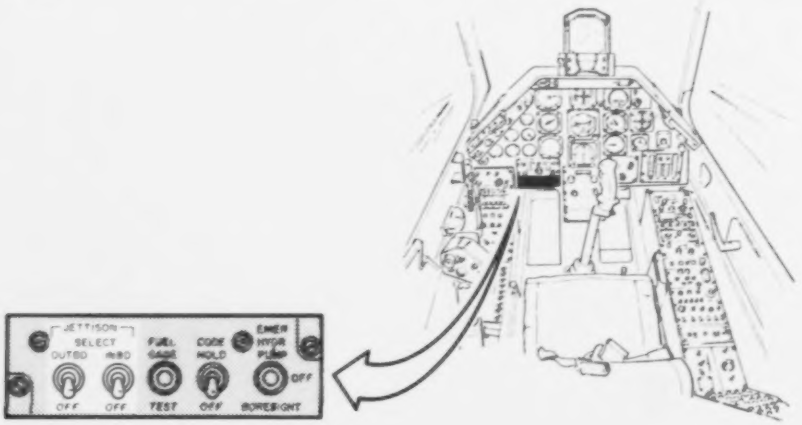
4. SET SWITCHES ON PILOT ARMAMENT CONTROL PANEL AS FOLLOWS:
   - MASTER ARM to OFF
   - WPN CONTR to GUNNER
   - WING STORE to RKT
   - RECOIL COMPEN to OFF
   - HSS RTCL to OFF
   - RANGE to SHORT


RECOIL COMPEN
OFF
WING STORE
RKT
GUN
WPN CONTR
GUNNER
FIXED
PILOT
ARMED
STBY
ARMT
RANGE
LONG
MED
SHORT
HSS RTCL
TEST
OFF
BRT
MASTER ARM
OFF
STBY

PILOT ARMAMENT CONTROL PANEL

ARR82-25471

5. SET SWITCHES ON PILOT JETTISON CONTROL PANEL AS FOLLOWS:
   - JETTISON SELECT
     - INBD to OFF
     - OUTBD to OFF


JETTISON
SELECT
OUTBD
INBD
OFF
OFF
FUEL GAGE
TEST
CODE HOLD
OFF
EMER HYDR PUMP
OFF
BORESIGHT

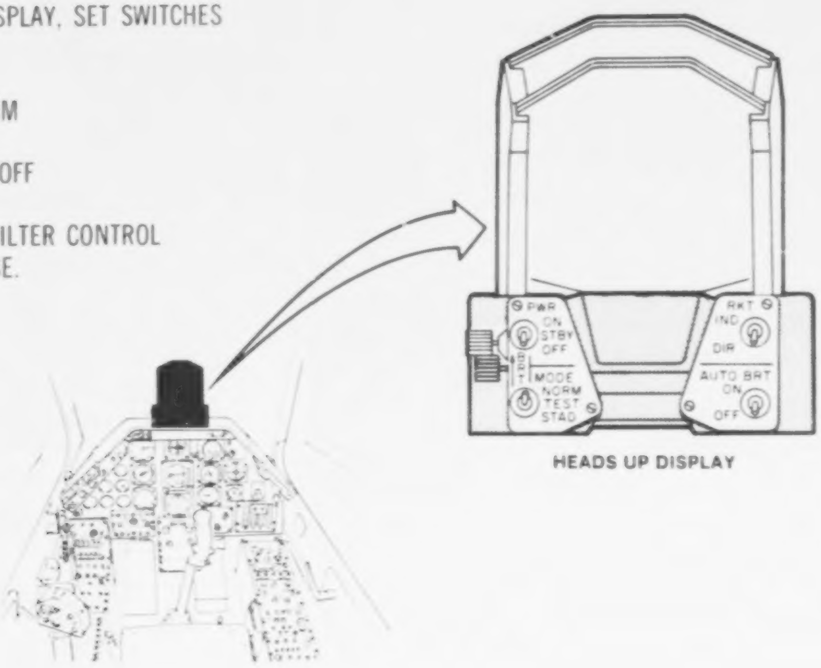
PILOT JETTISON CONTROL PANEL

ARR82-25472

HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP (cont)

6. ON HEAD UP DISPLAY, SET SWITCHES AS FOLLOWS:
   - PWR to OFF
   - MODE to NORM
   - RKT to DIR
   - AUTO BRT to OFF

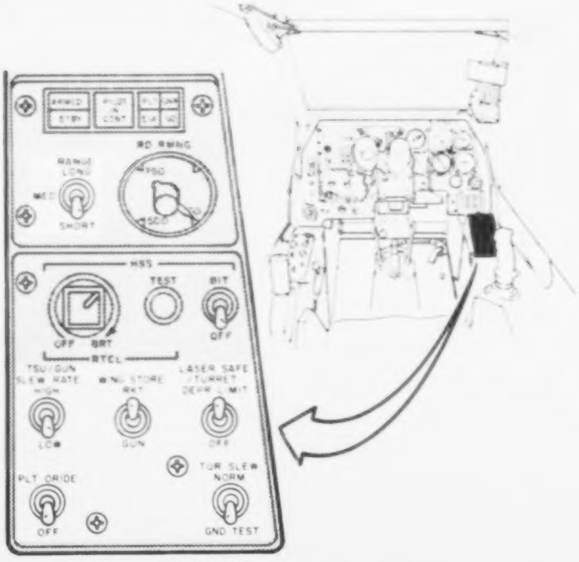
7. ROTATE NIGHT FILTER CONTROL FULLY CLOCKWISE.


PWR
ON
STBY
OFF
BRT
MODE
NORM
TEST
STAD
RKT
IND
DIR
AUTO BRT
ON
OFF

HEADS UP DISPLAY

ARR82-25473

8. SET SWITCHES ON GUNNER ARMAMENT CONTROL PANEL AS FOLLOWS:
   - PLT ORIDE to OFF
   - WING STORE to RKT
   - RANGE to SHORT
   - LASER SAFE/TURRET DEPR LIMIT to on
   - TUR SLEW to GND TEST
   - TSU/GUN SLEW RATE to LOW


ARMED
STBY
PILOT IN CONT
RANGE
LONG
MED
SHORT
HSS
TEST
BIT
OFF
OFF
BRT
RTCL
TSU/GUN SLEW RATE
HIGH
LOW
WING STORE
RKT
GUN
LASER SAFE /TURRET DEPR LIMIT
OFF
TUR SLEW
NORM
GND TEST
PLT ORIDE
OFF

GUNNER ARMAMENT CONTROL PANEL

ARR82-25474

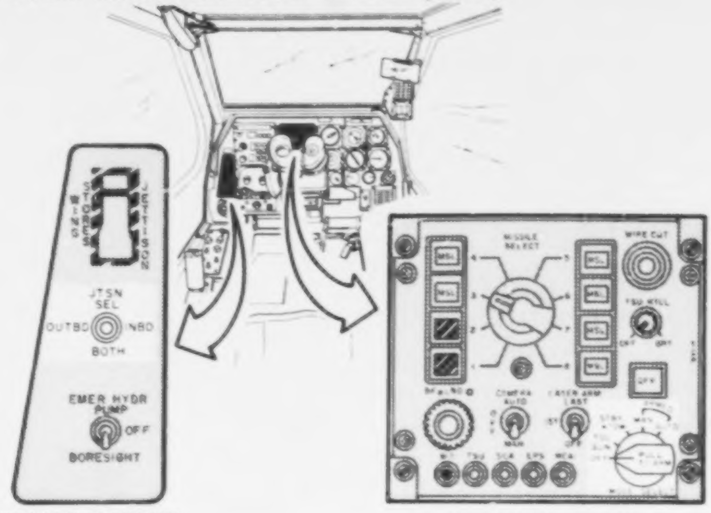
best copy available

2-6. HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP (cont)

HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP (cont)

9. ON GUNNER JETTISON CONTROL PANEL, SET JTSN SEL SWITCH TO BOTH.

10. ON TOW CONTROL PANEL, SET MODE SELECT SWITCH TO OFF.


WING STORES JETTISON
JTSN SEL
OUTBD
INBD
BOTH
EMER HYDR PUMP
OFF
BORESIGHT
MISSILE SELECT
WIRE CUT
MSL
OFF

GUNNER JETTISON CONTROL PANEL

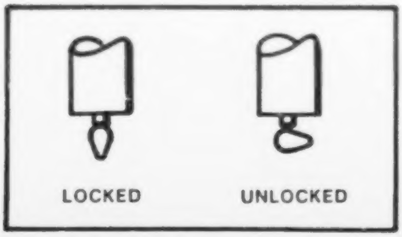
TOW CONTROL PANEL

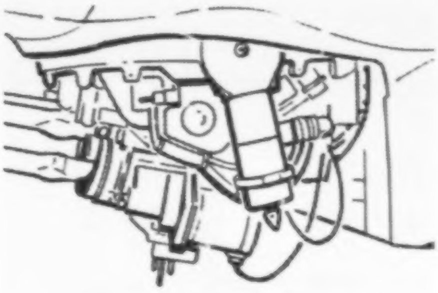
ARR82-25475

11. SUPPORT GUN BARRELS AND SET ELEVATION AND AZIMUTH DRIVE MOTOR BRAKE HANDLES TO UNLOCKED POSITION.

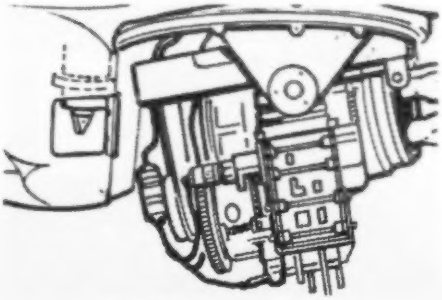
12. MANUALLY POSITION TURRET TO APPROXIMATELY 0° EL 0° AZ THEN MANUALLY POSITION TURRET TO RIGHT AND LEFT MECHANICAL LIMITS, TO MAKE SURE TURRET MOVES FREELY AND DOES NOT ENCOUNTER ANY OBSTRUCTIONS.

13. RETURN TURRET TO STOW POSITION AND SET AZIMUTH AND ELEVATION DRIVE MOTOR BRAKE HANDLES TO LOCKED POSITION.


LOCKED
UNLOCKED



ELEVATION DRIVE MOTOR BRAKE HANDLE



AZIMUTH DRIVE MOTOR BRAKE HANDLE

ARR82-28150

END OF TASK

2-7. ELECTRICAL POWER APPLICATION/REMOVAL

DESCRIPTION

This task covers: Application/removal of electrical power prior/after performing checks, tests, adjustments, alinements, and boresighting.

INITIAL SETUP

Tools/Test and Support Equipment:
Helicopter Auxiliary (Aux) Power Unit (28 Vdc, 300 amperes)

Personnel Required: (2)
68J Aircraft Fire Control Repairer/
68M Aircraft Weapon Systems Repairer

References:
TM 55-1520-236-23

Equipment Conditions:
HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP performed, para 2-6.
Aux power panel open.

POWER APPLICATION

WARNING

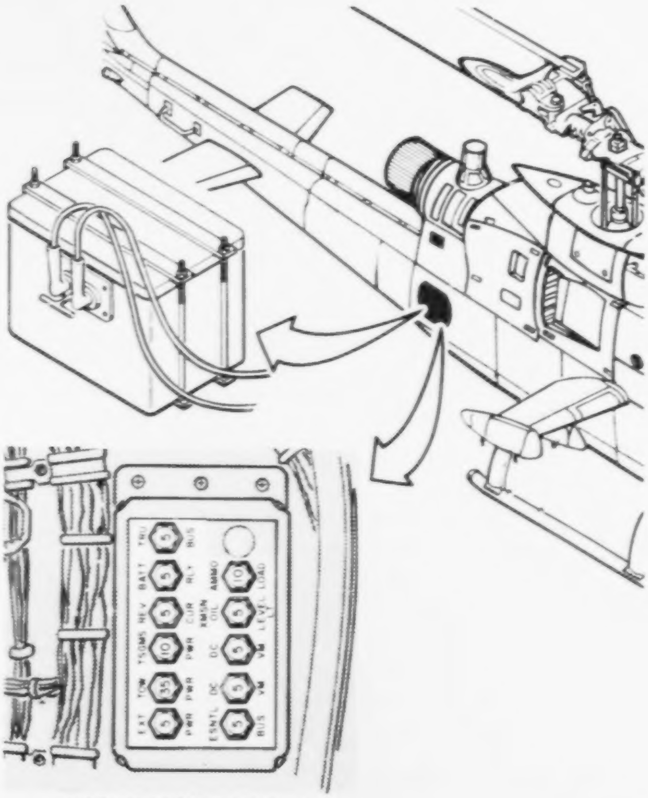
Warn people working on or near helicopter before applying electrical power.

CAUTION

Minimum acceptable battery voltage is 22.0 Vdc. If battery voltage is below 22.0 Vdc the battery must be replaced before applying electrical power. See TM 55-1520-236-23. Low battery voltage may cause damage to battery.

1. CONNECT BATTERY.

2. CLOSE ALL CIRCUIT BREAKERS ON BATTERY COMPARTMENT CIRCUIT BREAKER PANEL.



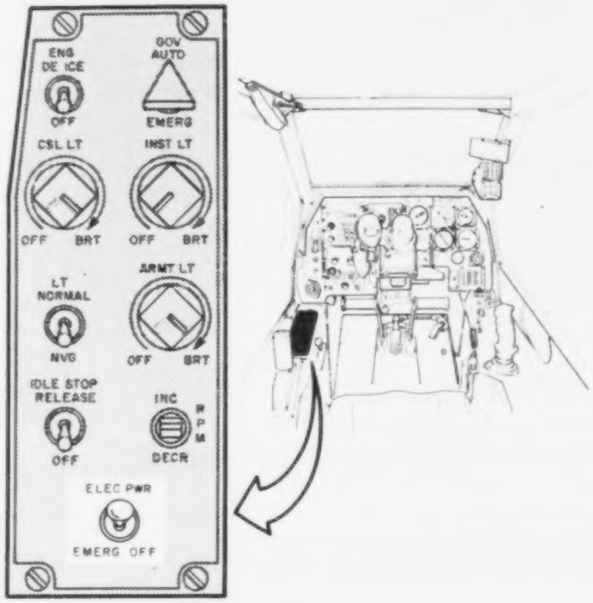
CIRCUIT BREAKER PANEL

ARR82 25252

2-7. ELECTRICAL POWER APPLICATION/REMOVAL (cont)

POWER APPLICATION (cont)

3. ON GUNNER MISCELLANEOUS CONTROL PANEL, SET ELEC PWR/EMERG OFF SWITCH TO ELEC PWR.


ENG
DE ICE
OFF
GOV
AUTO
EMERG
CSL LT
OFF
BRT
INST LT
OFF
BRT
LT
NORMAL
NVG
ARMT LT
OFF
BRT
IDLE STOP
RELEASE
OFF
INC
RPM
DECR
ELEC PWR
EMERG OFF

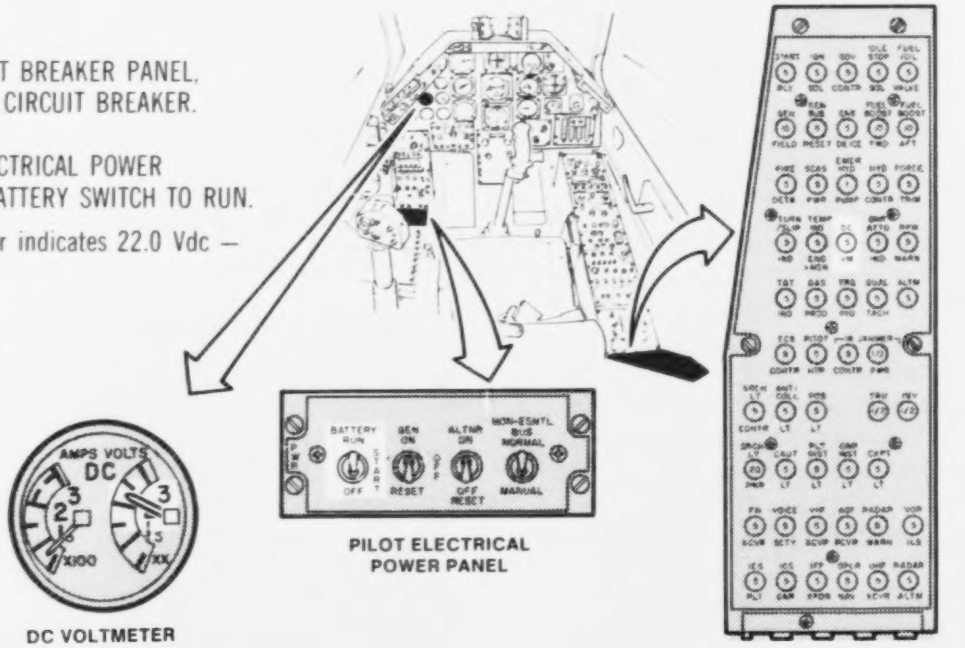
GUNNER MISCELLANEOUS CONTROL PANEL

ARR82-25253

4. ON DC CIRCUIT BREAKER PANEL, CLOSE DC VM CIRCUIT BREAKER.

5. ON PILOT ELECTRICAL POWER PANEL, SET BATTERY SWITCH TO RUN.

   DC voltmeter indicates 22.0 Vdc – 24.0 Vdc.


AMPS VOLTS
DC
2
3
X100
3
XX
BATTERY
RUN
OFF
START
GEN
ON
RESET
OFF
ALTNR
ON
OFF
RESET
NON-ESNTL
BUS
NORMAL
MANUAL
START
RLY
IGN
SOL
GOV
CONTR
IDLE
STOP
SOL
FUEL
VALVE
GEN
FIELD
GEN
BUS
RESET
ENG
DE ICE
FUEL
BOOST
FWD
FUEL
BOOST
AFT
FIRE
DETR
SCAS
PWR
EMER
HYD
PUMP
HYD
CONTR
FORCE
TRIM
TURN
/SLIP
IND
TEMP
IND
ENG
XMSN
DC
VM
ATTD
IND
RPM
WARN
TGT
IND
GAS
PROD
TRQ
IND
DUAL
TACH
ALTM
ECS
CONTR
PITOT
HTR
IR
CONTR
JAMMER
PWR
SRCH
LT
CONTR
ANTI
COLL
LT
POS
LT
VOICE
SCTY
RADAR
WARN
VOR
ILS
ICS
PLT
ICS
GNR
IFF
XPDR
UHF
RCVR
RADAR
ALTM

DC VOLTMETER

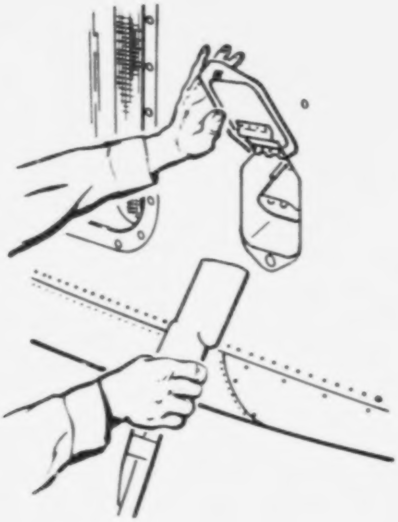
PILOT ELECTRICAL POWER PANEL

DC CIRCUIT BREAKER PANEL

ARR82-25254

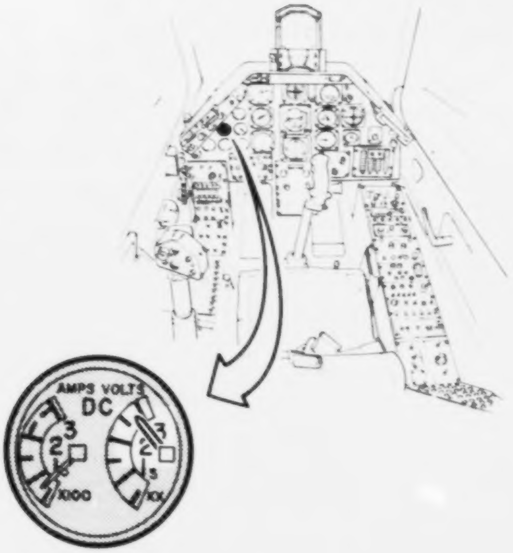
POWER APPLICATION (cont)

6. CONNECT AUX POWER UNIT.
7. TURN ON AUX POWER UNIT.



ARR82-25255

8. ADJUST AUX POWER UNIT FOR 28 TO 30 VDC AS INDICATED ON HELICOPTER DC VOLTMETER.


AMPS VOLTS
DC
3
2
X100
3
2
.5
10X

DC VOLTMETER

ARR82-25256

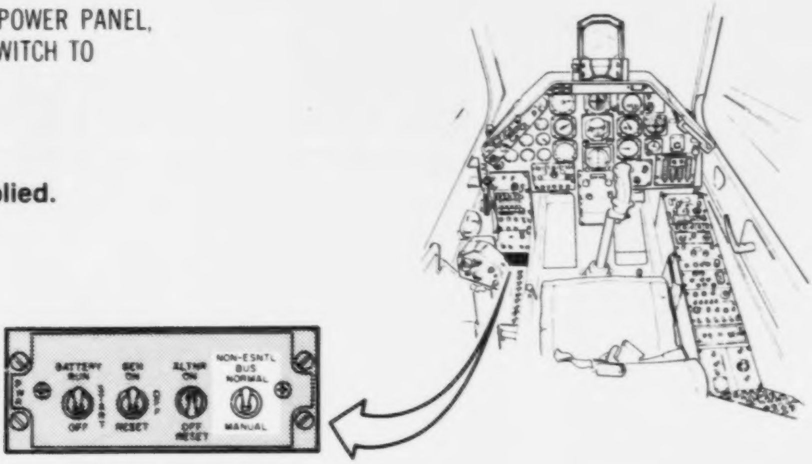
2-7. ELECTRICAL POWER APPLICATION/REMOVAL (cont)

POWER APPLICATION (cont)

9. ON PILOT ELECTRICAL POWER PANEL, SET NON-ESNTL BUS SWITCH TO NORMAL.

NOTE

Power is now applied.

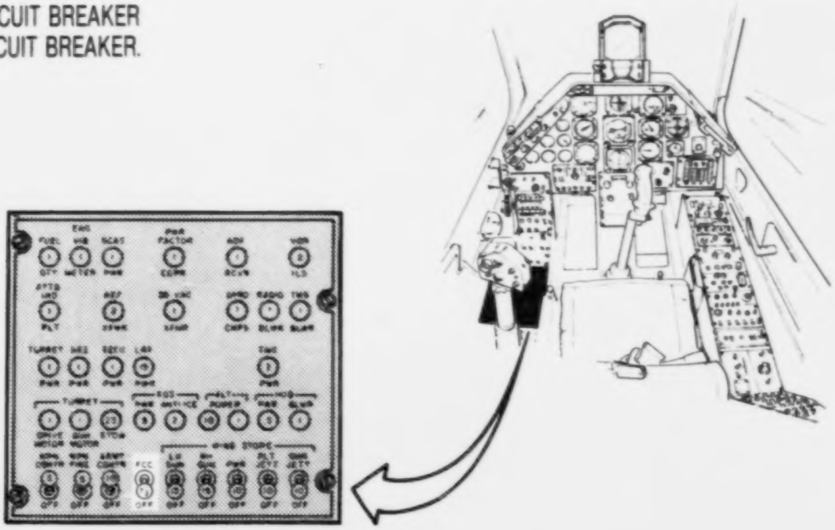

BATTERY
RUN
START
OFF
GEN
ON
RESET
ALTNR
ON
OFF
RESET
NON-ESNTL
BUS
NORMAL
MANUAL

PILOT ELECTRICAL
POWER PANEL

ARR82-25259

POWER REMOVAL

10. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, OPEN FCC CIRCUIT BREAKER.

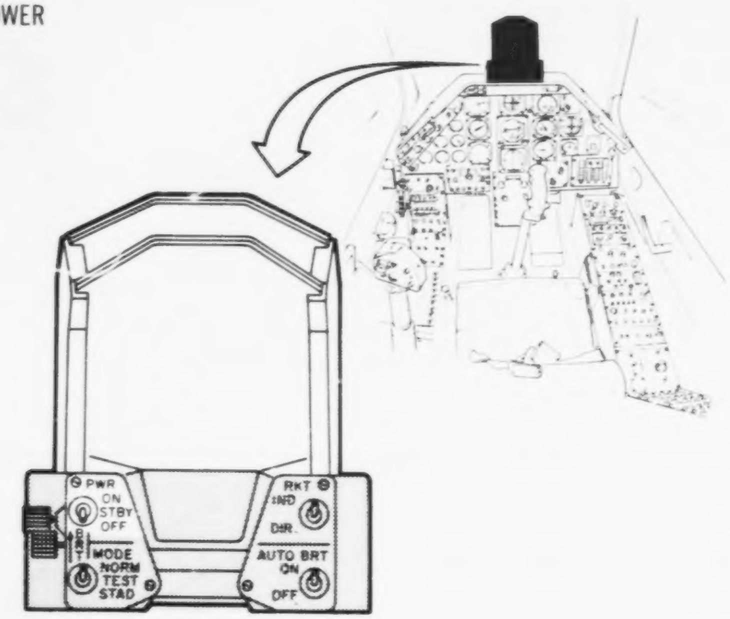

FUEL
PWR
FACTOR
VOR
ILS
RADIO
TURRET
PWR
DRIVE
MOTOR
STOW
WING STORE
FCC
OFF

AC / ARMAMENT
CIRCUIT BREAKER PANEL

ARR82-25260

POWER REMOVAL (cont)

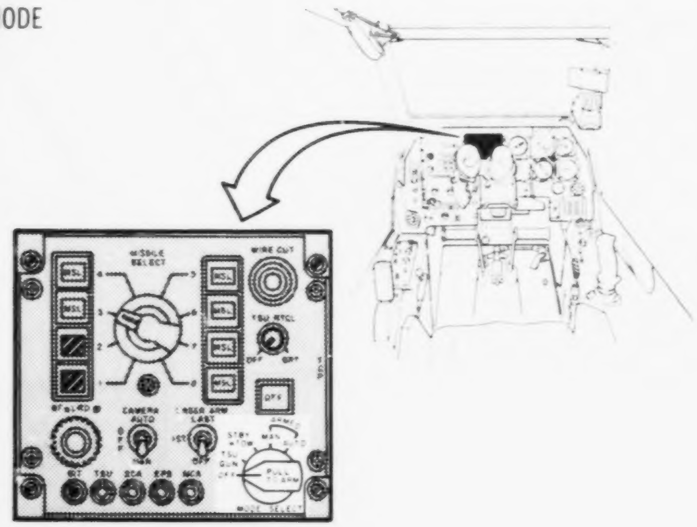
11. ON HEAD UP DISPLAY, SET POWER SWITCH TO OFF.


PWR
ON
STBY
OFF
BRT
MODE
NORM
TEST
STAD
RKT
IND
DIR.
AUTO BRT
ON
OFF

HEAD UP DISPLAY

ARR82 25261

12. ON TOW CONTROL PANEL, SET MODE SELECT SWITCH TO OFF.


MISSILE SELECT
1
2
3
4
5
6
7
8
MSL
WIRE CUT
TSU RTCL
OFF
BRT
OFF
CAMERA
AUTO
OFF
MAN
LASER ARM
LAST
1ST
OFF
STBY
TOW
TSU
GUN
OFF
MAN
ARMED
AUTO
PULL TO ARM
MODE SELECT
BIT
TSU
SCA
EPS
MCA

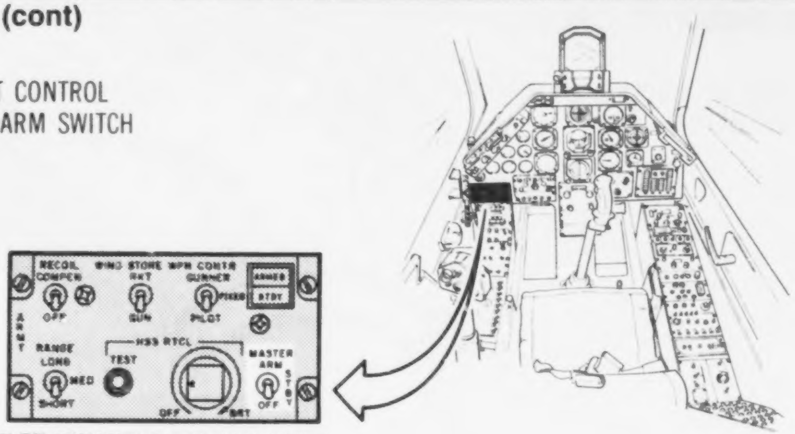
TOW CONTROL PANEL

ARR82 25265

2-7. ELECTRICAL POWER APPLICATION/REMOVAL (cont)

POWER REMOVAL (cont)

13. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO OFF.


RECOIL COMPEN
OFF
WING STORE RKT
GUN
WPN CONTR GUNNER
FIXED
PILOT
ARMED
STBY
ARMY
RANGE
LONG
MED
SHORT
HSS RTCL
TEST
OFF
BRT
MASTER ARM
STBY
OFF

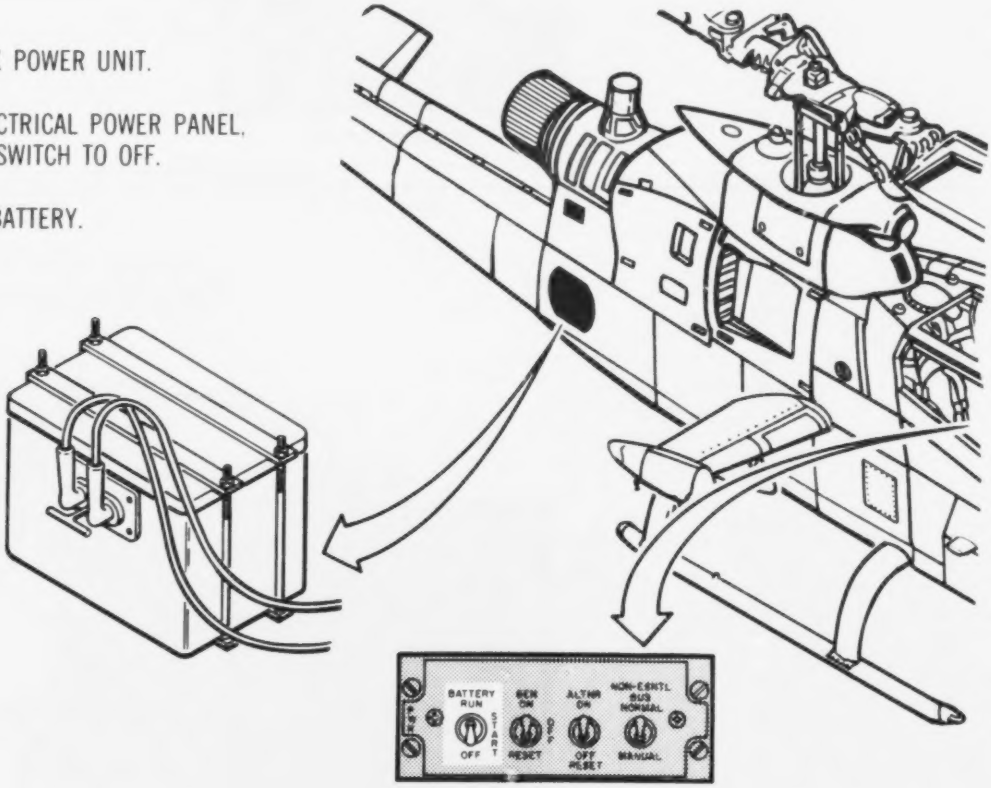
PILOT ARMAMENT CONTROL PANEL

ARR82-25269

14. TURN OFF AUX POWER UNIT.

15. ON PILOT ELECTRICAL POWER PANEL, SET BATTERY SWITCH TO OFF.

16. DISCONNECT BATTERY.


BATTERY RUN
START
OFF
GEN ON
OFF
RESET
ALTNR ON
OFF RESET
NON-ESNTL BUS NORMAL
MANUAL

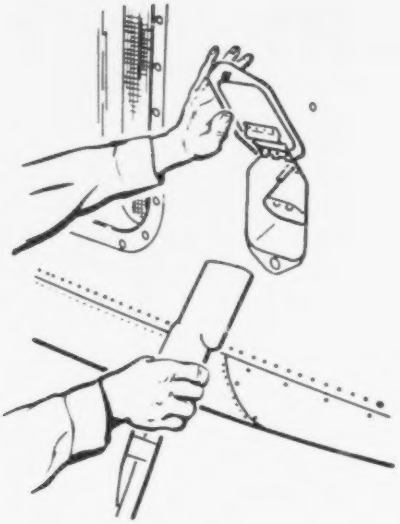
PILOT ELECTRICAL POWER PANEL

ARR82-25270

POWER REMOVAL (cont)

17. DISCONNECT AUX POWER UNIT.

18. PERFORM HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP, PARA 2-6.



ARR82-25271

END OF TASK

2-8. TURRET SUBSYSTEM PREOPERATIONAL CHECK

DESCRIPTION

This task covers: Turret subsystem checkout.

INITIAL SETUP

Tools/Test and Support Equipment:
- Tool Set, A/C Armament Repairman: Basic
- Tool Set, A/C Armament Repairman: Supplemental
- Firing Simulator Assembly (P/O Electronics Systems Test Set: M137)

Personnel Required: (3)
- 68J Aircraft Fire Control Repairer/
- 68M Aircraft Weapon Systems Repairer

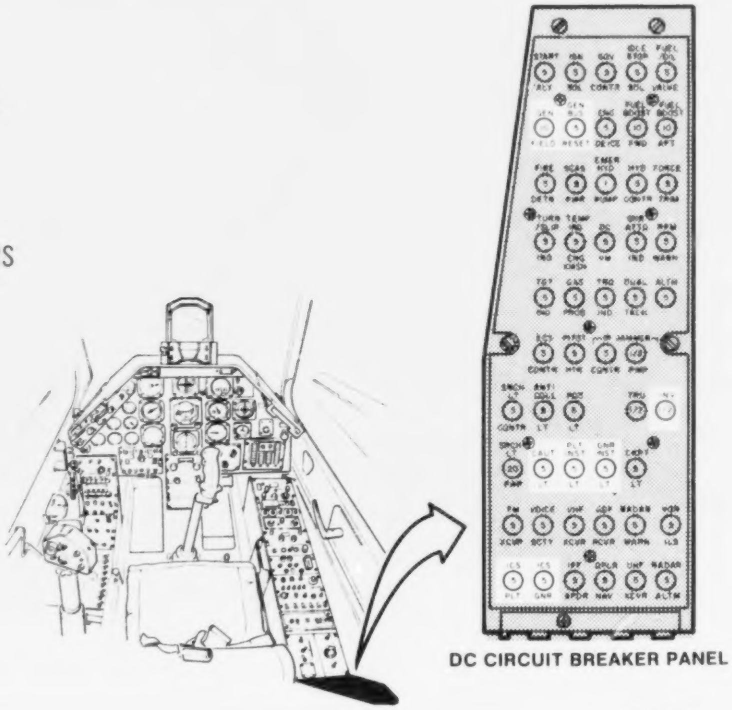
Equipment Conditions:
- Turret subsystem cable W2P1 disconnected from W3J1
- HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP performed, para 2-6.
- Power applied. See ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.
- TSU window cover removed.

CHECK SETUP

NOTE

ICS PLT and ICS GNR circuit breakers may be closed to provide internal communications.

1. CLOSE FOLLOWING CIRCUIT BREAKERS ON DC CIRCUIT BREAKER PANEL:
    - GEN FIELD
    - GEN BUS RESET
    - INV
    - CAUT LT
    - PLT INST LT
    - GNR INST LT
    - ICS PLT
    - ICS GNR

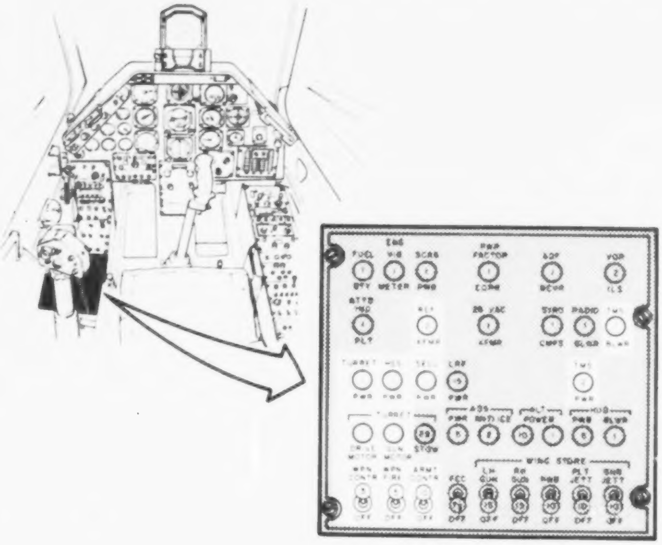

GEN FIELD
GEN BUS RESET
FUEL BOOST FWD
FUEL BOOST AFT
CAUT LT
PLT INST LT
GNR INST LT
ICS PLT
ICS GNR
UHF XCVR
RADAR ALTM
ALTM

DC CIRCUIT BREAKER PANEL

ARR82-25314

CHECK SETUP (cont)

2. CLOSE FOLLOWING CIRCUIT BREAKERS ON AC/ARMAMENT CIRCUIT BREAKER PANEL:
   - REF XFMR
   - TMS BLWR
   - TURRET PWR
   - HSS PWR
   - SECU PWR
   - TMS PWR
   - TURRET DRIVE MOTOR
   - TURRET GUN MOTOR
   - WPN CONTR
   - WPN FIRE
   - ARMT CONTR

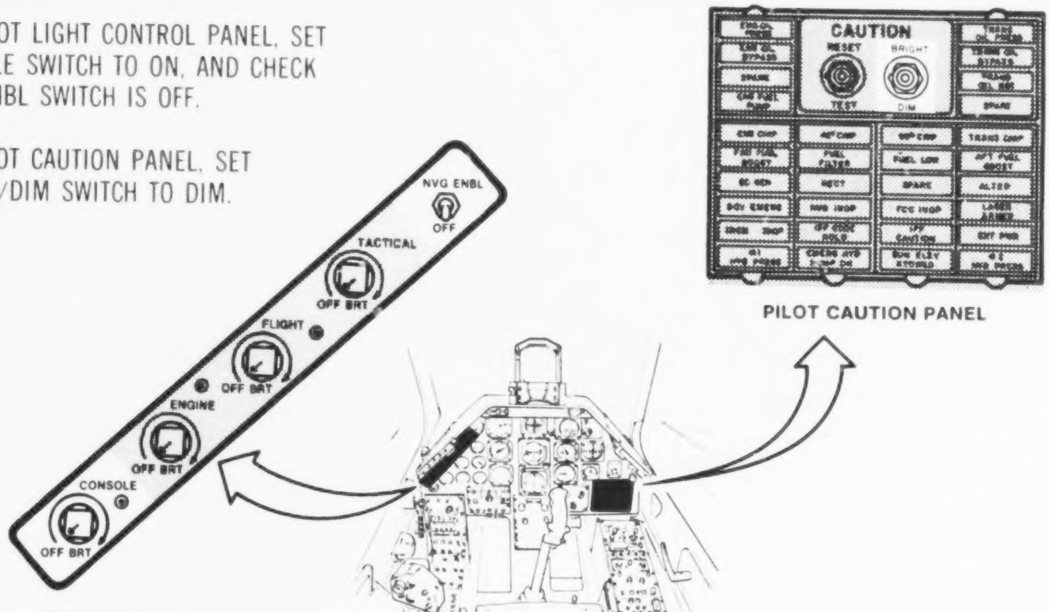


AC / ARMAMENT CIRCUIT BREAKER PANEL

ARR82 25313

3. ON PILOT LIGHT CONTROL PANEL, SET CONSOLE SWITCH TO ON, AND CHECK NVG ENBL SWITCH IS OFF.

4. ON PILOT CAUTION PANEL, SET BRIGHT/DIM SWITCH TO DIM.


CAUTION
RESET
TEST
BRIGHT
DIM
NVG ENBL
OFF
TACTICAL
OFF BRT
FLIGHT
OFF BRT
ENGINE
OFF BRT
CONSOLE
OFF BRT

PILOT CAUTION PANEL

PILOT LIGHT CONTROL PANEL

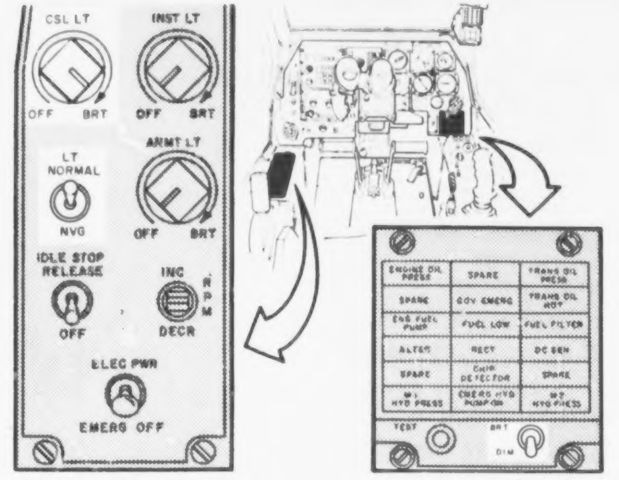
ARR82 25257

2-8. TURRET SUBSYSTEM PREOPERATIONAL CHECK (cont)

CHECK SETUP (cont)

5. SET SWITCHES ON GUNNER MISCELLANEOUS CONTROL PANEL AS FOLLOWS:
   CSL LT OFF/BRT to ON
   LT to NORMAL

6. ON GUNNER CAUTION PANEL, SET BRT/DIM SWITCH TO DIM.


CSL LT
OFF
BRT
INST LT
OFF
BRT
LT
NORMAL
NVG
ARMT LT
OFF
BRT
IDLE STOP
RELEASE
OFF
INC
RPM
DECR
ELEC PWR
EMERG OFF
ENGINE OIL PRESS
SPARE
TRANS OIL PRESS
SPARE
GOV EMERG
TRANS OIL HOT
ENG FUEL PUMP
FUEL LOW
FUEL FILTER
ALTER
RECT
DC GEN
SPARE
CHIP DETECTOR
SPARE
#1 HYD PRESS
EMERG HYD PUMP ON
#2 HYD PRESS
TEST
BRT
DIM

GUNNER MISCELLANEOUS CONTROL PANEL

GUNNER CAUTION PANEL

ARR82 25258

GUNNER AND PILOT TURRET CONTROL CHECKS

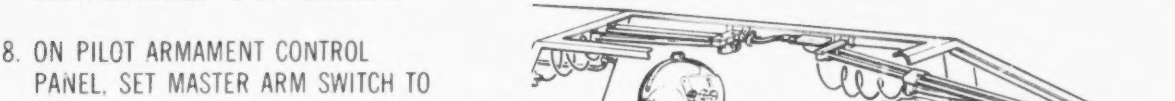
7. CONNECT PILOT AND GUNNER HELMET SIGHT LINKAGES TO BIT BRACKETS.

8. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO STBY.

   STBY indicators light.

9. ON GUNNER ARMAMENT CONTROL PANEL, MOMENTARILY POSITION HSS BIT SWITCH TO BIT.

   GO indicator lights in approximately 2 seconds.


RECOIL
COMPER
OFF
WING STORE
RKT
GUN
WPN CONTR
GUNNER
FIXED
PILOT
ARMED
STBY
ARMT
RANGE
LONG
MED
SHORT
HSS RTCL
TEST
OFF
BRT
MASTER
ARM
STBY
OFF
ARMED
STBY
PILOT IN CONT
PLT
GUN
S/A
GO
RD RNG
RANGE
LONG
MED
SHORT
750
1500
HSS
TEST
BIT
OFF
OFF
BRT
RTCL

PILOT ARMAMENT CONTROL PANEL

GUNNER ARMAMENT CONTROL PANEL

ARR82-25315

GUNNER AND PILOT TURRET CONTROL CHECKS (cont)

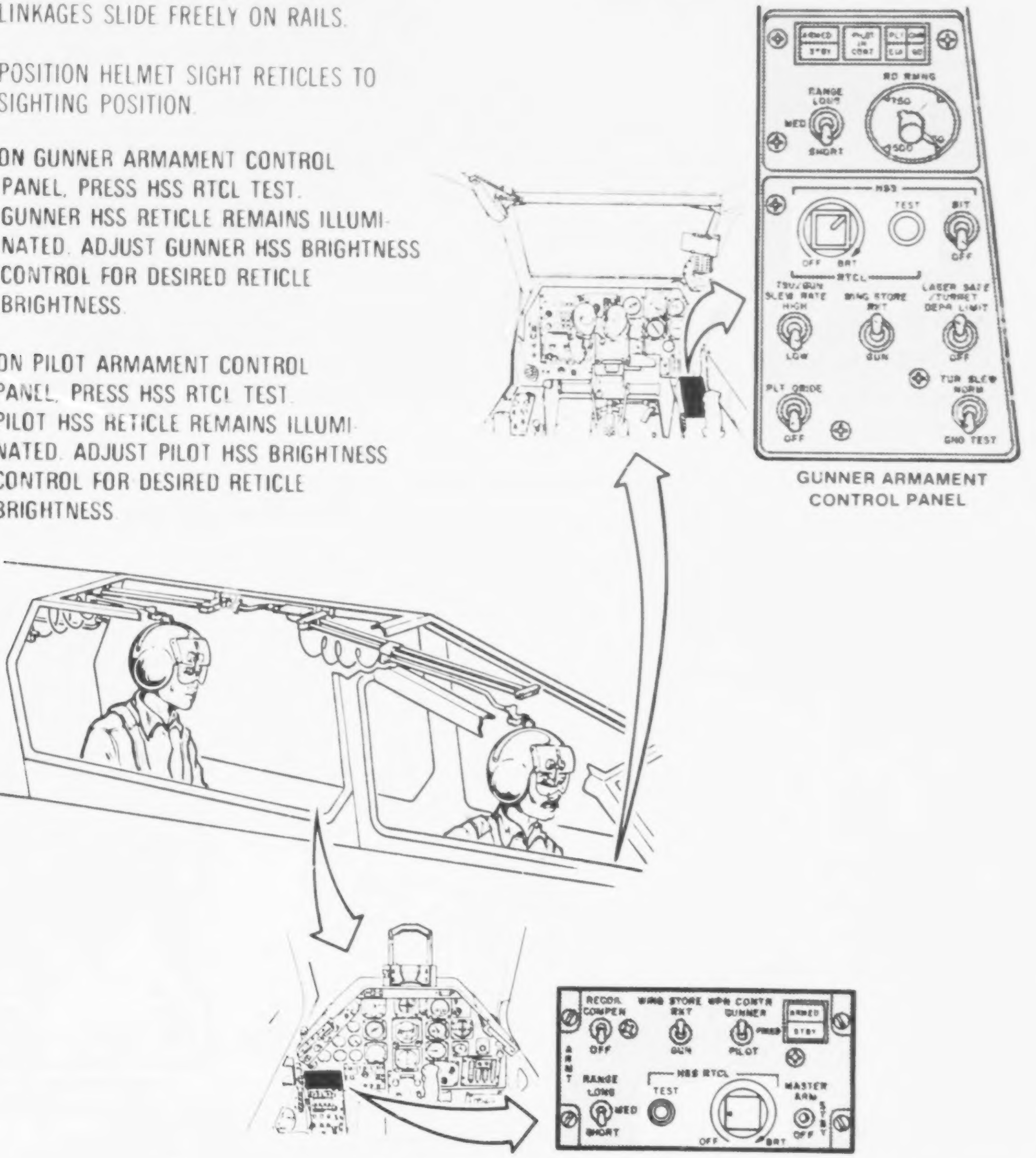
10. CONNECT PILOT AND GUNNER HELMET SIGHT LINKAGES TO HELMET RECEPTACLES.

11. CHECK THAT PILOT AND GUNNER LINKAGES SLIDE FREELY ON RAILS.

12. POSITION HELMET SIGHT RETICLES TO SIGHTING POSITION.

13. ON GUNNER ARMAMENT CONTROL PANEL, PRESS HSS RTCL TEST. GUNNER HSS RETICLE REMAINS ILLUMINATED. ADJUST GUNNER HSS BRIGHTNESS CONTROL FOR DESIRED RETICLE BRIGHTNESS.

14. ON PILOT ARMAMENT CONTROL PANEL, PRESS HSS RTCL TEST. PILOT HSS RETICLE REMAINS ILLUMINATED. ADJUST PILOT HSS BRIGHTNESS CONTROL FOR DESIRED RETICLE BRIGHTNESS.


ARMED
STBY
PILOT IN CONT
PLT
EIA
RANGE
LOUT
MED
SHORT
RD RMNG
750
500
HSS
TEST
BIT
OFF
OFF
BRT
RTCL
TSU/GUN SLEW RATE
HIGH
LOW
WING STORE RKT
GUN
LASER SAFE /TURRET DEPR LIMIT
OFF
PLT ORIDE
OFF
TUR SLEW
NORM
GND TEST
RECOIL COMPEN
OFF
WING STORE RKT
GUN
WPN CONTR
GUNNER
PILOT
FIRED
ARMED
STBY
ARMT
RANGE
LONG
MED
SHORT
HSS RTCL
TEST
OFF
BRT
MASTER ARM
STBY
OFF

GUNNER ARMAMENT CONTROL PANEL

PILOT ARMAMENT CONTROL PANEL

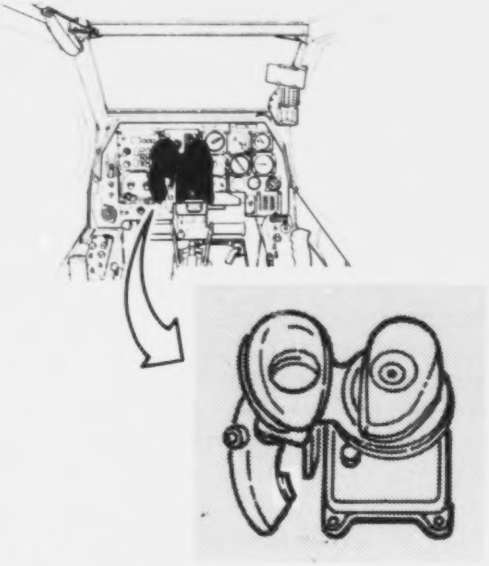
ARR82-25330

2-8. TURRET SUBSYSTEM PREOPERATIONAL CHECK (cont)

GUNNER AND PILOT TURRET CONTROL CHECKS (cont)

15. WITH GUNNER HELMET SIGHT (GHS) AT APPROXIMATELY 0° EL 0° AZ, ON TSU, PRESS AND HOLD LHG ACTION SWITCH.
    a. Turret alines with GHS.
    b. Reticle on steady.
16. SLOWLY MOVE GHS UP, RIGHT, AND LEFT.
    a. Turret follows GHS.
    b. Reticle on steady if turret and GHS are in coincidence.
17. ON TSU, RELEASE LHG ACTION SWITCH.

    Turret returns to stow position.

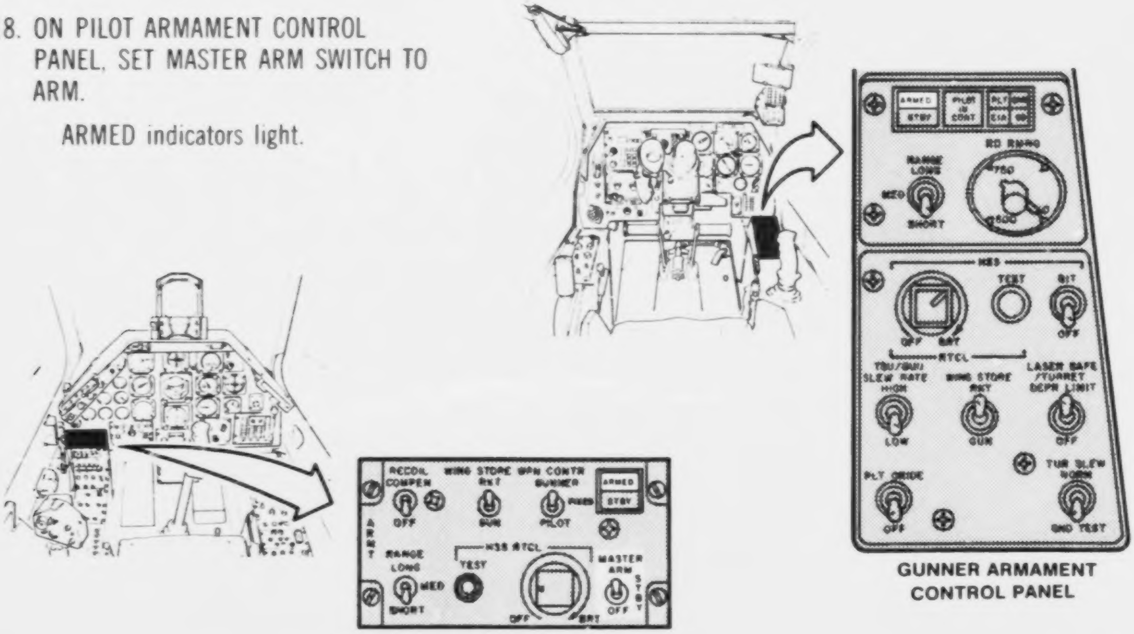


TSU

ARR82-25264

18. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO ARM.

    ARMED indicators light.


ARMED
STBY
PILOT IN CONT
PLT
RD RNG
RANGE
LONG
MED
SHORT
750
500
HSS
TEST
BIT
OFF
OFF
BRT
RTCL
TSU/GHS SLEW RATE
HIGH
LOW
WING STORE RKT
GUN
LASER SAFE /TURRET DEPR LIMIT
OFF
TUR SLEW
NORM
GND TEST
PLT ORIDE
OFF
RECOIL COMPEN
OFF
WING STORE RKT
GUN
WPN CONTR
GUNNER
FIXED
PILOT
ARMED
STBY
ARMT
RANGE
LONG
MED
SHORT
HSS RTCL
TEST
OFF
BRT
MASTER ARM
STBY
OFF

GUNNER ARMAMENT CONTROL PANEL

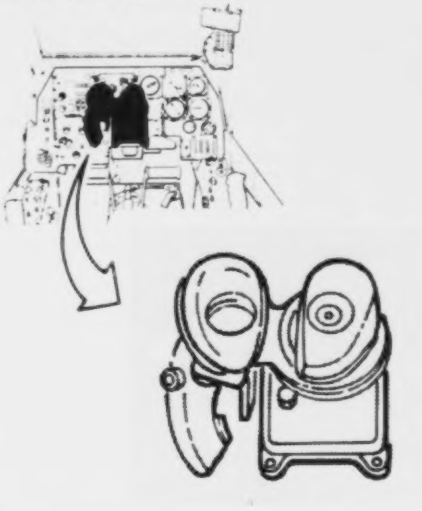
PILOT ARMAMENT CONTROL PANEL

ARR82-25331

GUNNER AND PILOT TURRET CONTROL CHECKS (cont)

19. WITH GHS AT APPROXIMATELY 0° AZ 0° EL, ON TSU, PRESS LHG ACTION SWITCH AND TRIGGER SWITCHES.
    a. Turret alines with GHS.
    b. M197 gun rotates.
    c. Feeder sprockets turn.

20. ON TSU, RELEASE LHG ACTION SWITCH AND TRIGGER SWITCHES.
    a. M197 gun stops rotating.
    b. Turret returns to stow position.


TSU
ARR82 25266

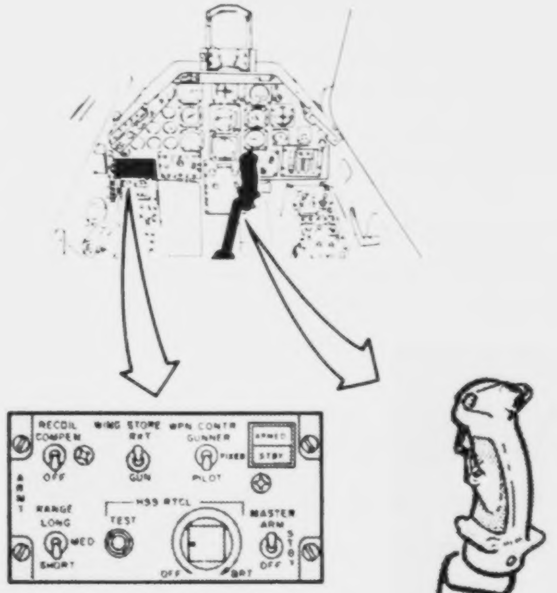
21. ON PILOT ARMAMENT CONTROL PANEL, SET WPN CONTR SWITCH TO PILOT.

22. WITH PILOT HELMET SIGHT (PHS) AT APPROXIMATELY 0° AZ 0° EL, PRESS AND HOLD PILOT CYCLIC STICK ACTION SWITCH.
    a. Turret alines with PHS.
    b. Reticle on steady.

23. SLOWLY MOVE PHS UP, RIGHT, AND LEFT.
    a. Turret follows PHS.
    b. Reticle on steady if turret and PHS are in coincidence.

24. RELEASE PILOT CYCLIC STICK ACTION SWITCH.

    Turret returns to stow position.


RECOIL COMPEN
OFF
WING STORE
RKT
GUN
WPN CONTR
GUNNER
FIXED
PILOT
ARMED
STBY
ARMT
RANGE
LONG
MED
SHORT
HSS RTCL
TEST
OFF
BRT
MASTER ARM
STBY
OFF
PILOT ARMAMENT CONTROL PANEL
PILOT CYCLIC STICK
ARR82 25267

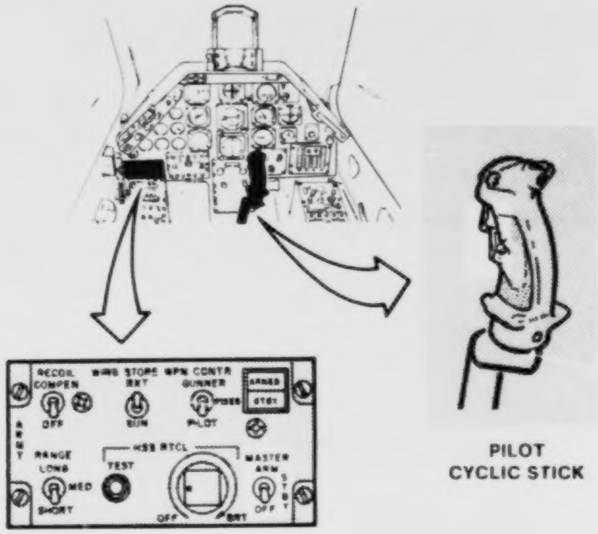
2-8. TURRET SUBSYSTEM PREOPERATIONAL CHECK (cont)

GUNNER AND PILOT TURRET CONTROL CHECKS (cont)

25. WITH PHS AT APPROXIMATELY 0° AZ 0° EL, PRESS PILOT CYCLIC STICK ACTION SWITCH AND TRIGGER SWITCH.
    a. Turret alines with PHS.
    b. M197 gun rotates.
    c. Feeder sprockets turn.

26. RELEASE PILOT CYCLIC STICK ACTION SWITCH AND TRIGGER SWITCH.
    a. M197 gun stops rotating.
    b. Turret returns to stow position.

27. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO OFF.


RECOIL COMPEN
OFF
WING STORE RKT
GUN
WPN CONTR GUNNER
PILOT
ARMED
STBY
ARMT
RANGE LONG
MED
SHORT
HSS RTCL
TEST
OFF
BRT
MASTER ARM
STBY
OFF

PILOT ARMAMENT CONTROL PANEL

PILOT CYCLIC STICK

ARR82 25268

PILOT OVERRIDE CHECK

28. ON GUNNER ARMAMENT CONTROL PANEL, SET PLT ORIDE SWITCH TO PLT ORIDE.

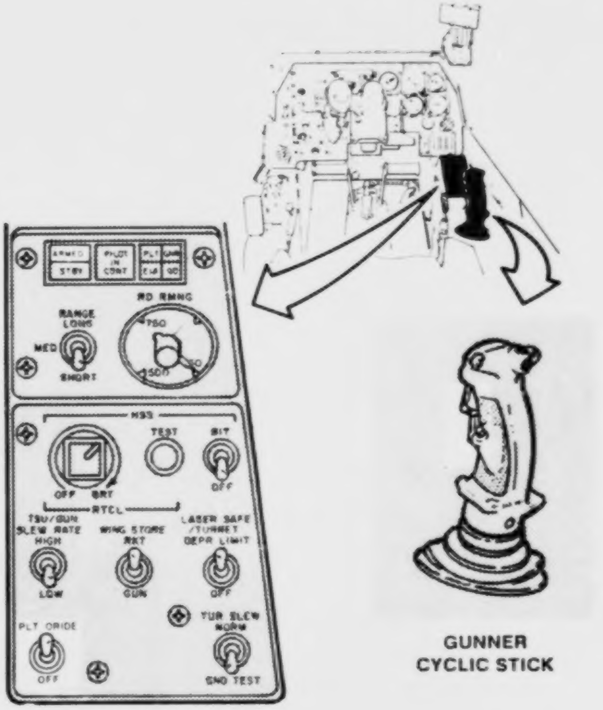
    ARMED indicator lights.

29. PRESS AND HOLD GUNNER CYCLIC STICK ACTION SWITCH AND MOVE GHS UP, RIGHT, AND LEFT.

    Turret follows GHS movements.

30. PRESS AND HOLD GUNNER CYCLIC STICK TRIGGER SWITCH.
    a. M197 gun rotates.
    b. Feeder sprockets turn.

31. RELEASE GUNNER CYCLIC STICK ACTION SWITCH AND TRIGGER SWITCH.
    a. M197 gun stops rotating.
    b. Turret returns to stow position.


ARMED
STBY
PILOT IN CONT
PLT
GNR
E/A
QD
RD RMNG
RANGE LONG
MED
SHORT
750
500
HSS
TEST
BIT
OFF
OFF
BRT
RTCL
TSU/GUN SLEW RATE HIGH
LOW
WING STORE RKT
GUN
LASER SAFE /TURRET DEPR LIMIT
OFF
TUR SLEW NORM
GND TEST
PLT ORIDE
OFF

GUNNER ARMAMENT CONTROL PANEL

GUNNER CYCLIC STICK

ARR82 25316

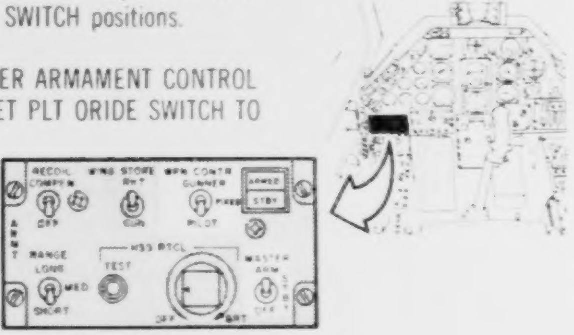
PILOT OVERRIDE CHECK (cont)

32. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO ARM.

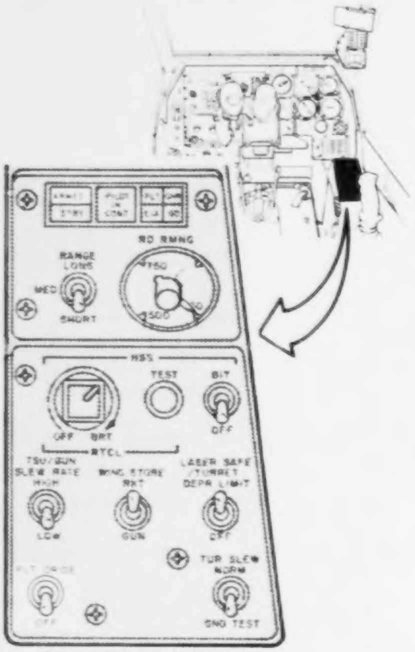
33. ON PILOT ARMAMENT CONTROL PANEL, SET WPN CONTR SWITCH TO FIXED AND THEN BACK TO PILOT.

    Turret does not respond to WPN CONTR SWITCH positions.

34. ON GUNNER ARMAMENT CONTROL PANEL, SET PLT ORIDE SWITCH TO OFF.


RECOIL COMPEN
OFF
WING STORE
RKT
GUN
WPN CONTR
GUNNER
FIXED
PILOT
ARMED
STBY
ARMT
RANGE
LONG
MED
SHORT
HSS RTCL
TEST
OFF
BRT
MASTER
ARM
STBY
OFF

PILOT ARMAMENT CONTROL PANEL


ARMED
STBY
PILOT IN CONT
PLT GAS
E-A
SQ
RD RMNG
RANGE
LONG
MED
SHORT
750
500
HSS
TEST
BIT
OFF
OFF
BRT
RTCL
TSU/GUN SLEW RATE
HIGH
LOW
WING STORE
RKT
GUN
LASER SAFE /TURRET DEPR LIMIT
OFF
TUR SLEW
NORM
GND TEST
PLT ORIDE
OFF

GUNNER ARMAMENT CONTROL PANEL

ARR82-25317

FIXED FORWARD AND FIRE VOLTS CHECK

35. ON PILOT ARMAMENT CONTROL PANEL, SET WPN CONTR SWITCH TO FIXED.

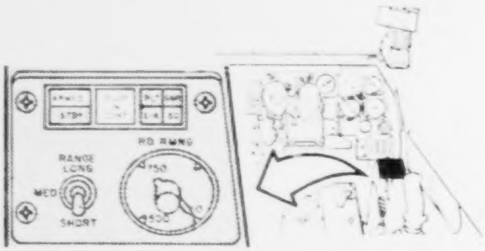
    a. Turret goes to approximately 0° el 0° az.

    b. PILOT IN CONT indicator lights on gunner armament control panel.

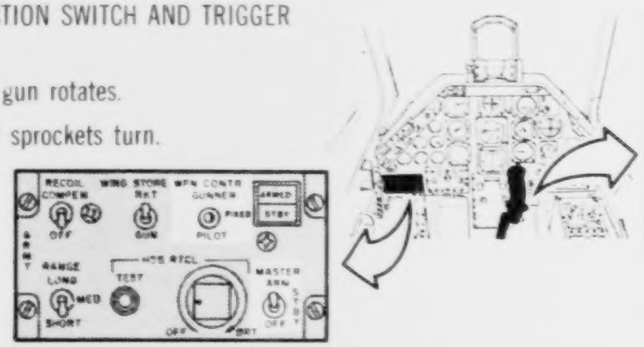
36. MOMENTARILY PRESS PILOT CYCLIC STICK ACTION SWITCH AND TRIGGER SWITCH.

    a. M197 gun rotates.

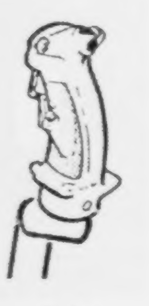
    b. Feeder sprockets turn.


ARMED
STBY
PILOT IN CONT
PLT GAS
E-A
SQ
RD RMNG
RANGE
LONG
MED
SHORT
750
500

GUNNER ARMAMENT CONTROL PANEL


RECOIL COMPEN
OFF
WING STORE
RKT
GUN
WPN CONTR
GUNNER
FIXED
PILOT
ARMED
STBY
ARMT
RANGE
LONG
MED
SHORT
HSS RTCL
TEST
OFF
BRT
MASTER
ARM
STBY
OFF

PILOT ARMAMENT CONTROL PANEL



PILOT CYCLIC STICK

ARR82-25323

2-8. TURRET SUBSYSTEM PREOPERATIONAL CHECK (cont)

FIXED FORWARD AND FIRE VOLTS CHECK (cont)

37. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO OFF.

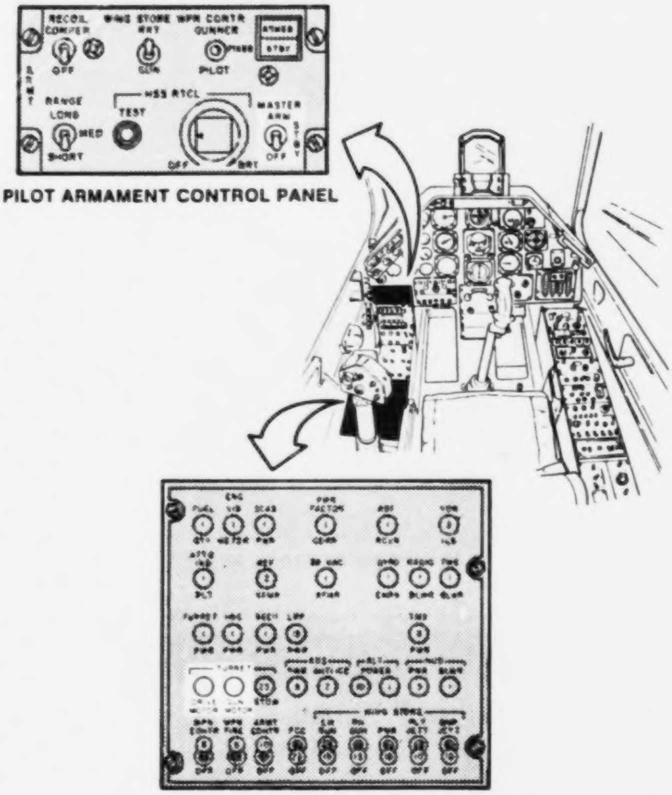
38. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, OPEN TURRET DRIVE MOTOR AND GUN MOTOR CIRCUIT BREAKERS.

WARNING

Do not put hands between lower support and saddle, personal injury could result.

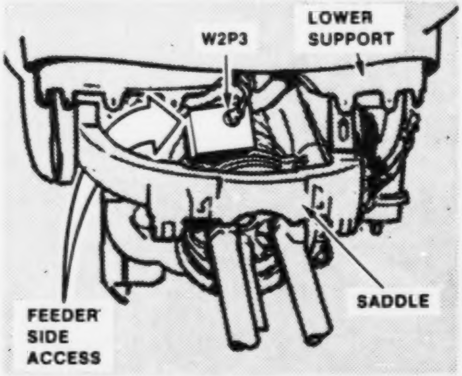
39. DISCONNECT FIRE VOLTS CABLE W2P3 FROM M197 GUN AND RECONNECT CABLE TO FIRING SIMULATOR ASSEMBLY. WORK FROM FEEDER SIDE ACCESS.

40. CONNECT TURRET SYSTEM CABLE W2P1 TO CONNECTOR W3J1.

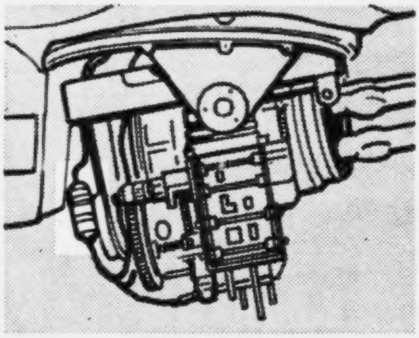

RECOIL
COMP/ER
OFF
WING STORE WPN CONTR
RKT
GUN
GUNNER
PILOT
ARMT
RANGE
LONG
MED
SHORT
HSS RTCL
TEST
OFF
BRT
MASTER
ARM
STBY
OFF
TURRET
DRIVE MOTOR
GUN MOTOR
WING STORE

PILOT ARMAMENT CONTROL PANEL

AC / ARMAMENT CIRCUIT BREAKER PANEL


W2P3
LOWER
SUPPORT
SADDLE
FEEDER
SIDE
ACCESS

FIRING SIMULATOR ASSEMBLY



W2P1 AND W3J1

ARR82-25324

FIXED FORWARD AND FIRE VOLTS CHECK (cont)

41. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO ARM.

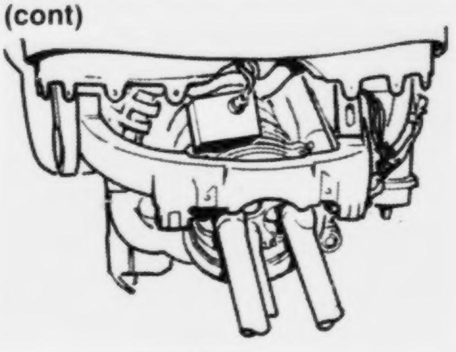
42. ON AC ARMAMENT CIRCUIT BREAKER PANEL, CLOSE TURRET DRIVE MOTOR AND GUN MOTOR CIRCUIT BREAKERS.

43. PRESS PILOT CYCLIC STICK ACTION SWITCH AND TRIGGER SWITCH.

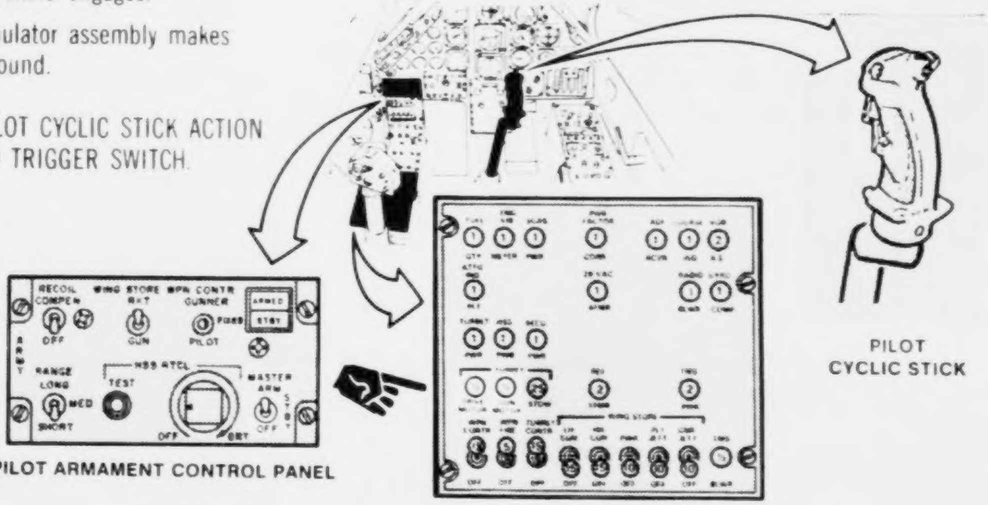
    a. Feeder solenoid engages.

    b. Firing simulator assembly makes clicking sound.

44. RELEASE PILOT CYCLIC STICK ACTION SWITCH AND TRIGGER SWITCH.



FIRING SIMULATOR ASSEMBLY



RECOIL COMPEN
WING STORE RKT
WPN CONTR GUNNER
ARMED
STBY
OFF
GUN
FIXED
PILOT
ARMT
RANGE LONG
MED
SHORT
M59 ATCL
TEST
MASTER ARM
OFF
STBY

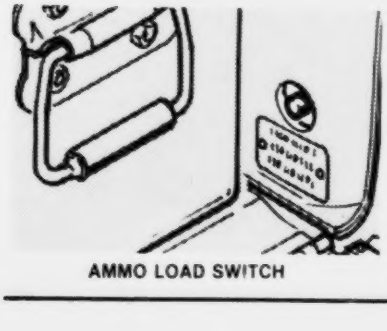
PILOT ARMAMENT CONTROL PANEL

AC / ARMAMENT CIRCUIT BREAKER PANEL

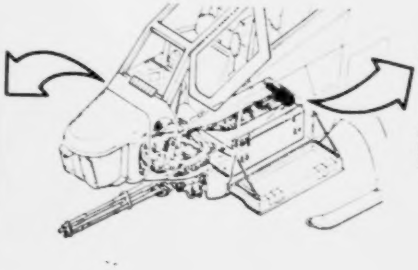
PILOT CYCLIC STICK

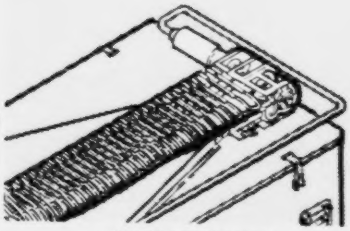
45. MOMENTARILY PRESS AMMO LOAD SWITCH IN AMMO BAY.

    Booster sprocket turns.



AMMO LOAD SWITCH





BOOSTER MOTOR

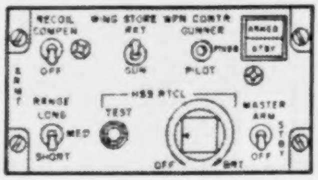
ARR82 25279

2-8. TURRET SUBSYSTEM PREOPERATIONAL CHECK (cont)

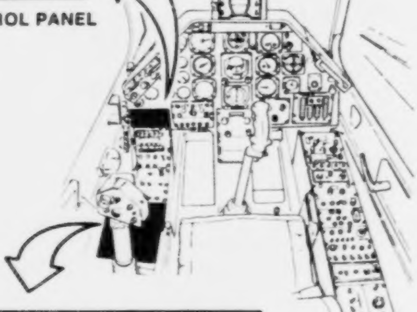
FIXED FORWARD AND FIRE VOLTS CHECK (cont)

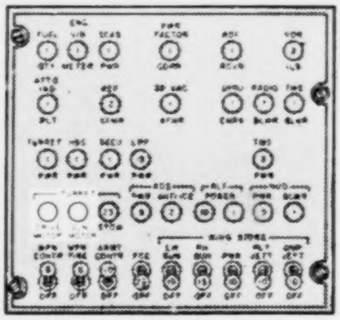
46. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO OFF.

47. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, OPEN TURRET DRIVE MOTOR AND GUN MOTOR CIRCUIT BREAKERS.


RECOIL COMPEN
OFF
WING STORE
RKT
GUN
WPN CONTR
GUNNER
PILOT
ARMED
STBY
ARMT
RANGE
LONG
MED
SHORT
HSS RTCL
TEST
OFF
BRT
MASTER ARM
STBY
OFF

PILOT ARMAMENT CONTROL PANEL




ENG
FUEL
TURRET
WING STORE

AC / ARMAMENT CIRCUIT BREAKER PANEL

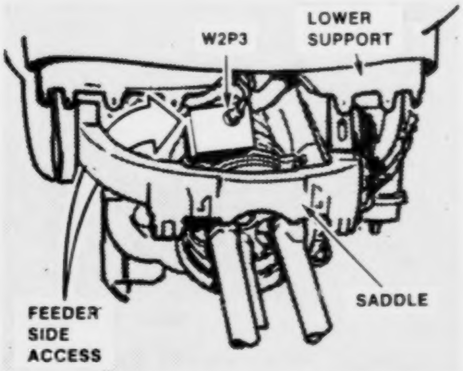
WARNING

Do not put hands between lower support and saddle, personal injury could result.

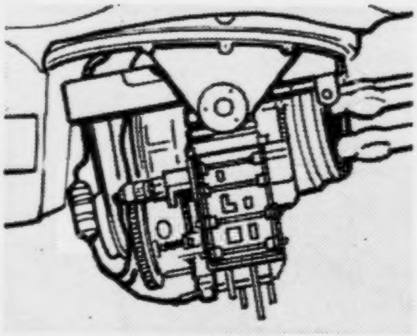
48. DISCONNECT FIRE VOLTS CABLE W2P3 FROM FIRING SIMULATOR ASSEMBLY AND RECONNECT CABLE TO M197 GUN. WORK FROM FEEDER SIDE ACCESS.

49. DISCONNECT TURRET SYSTEM CABLE W2P1 FROM CONNECTOR W3J1.

50. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, CLOSE TURRET DRIVE MOTOR AND GUN MOTOR CIRCUIT BREAKERS.


W2P3
LOWER SUPPORT
SADDLE
FEEDER SIDE ACCESS

FIRING SIMULATOR ASSEMBLY



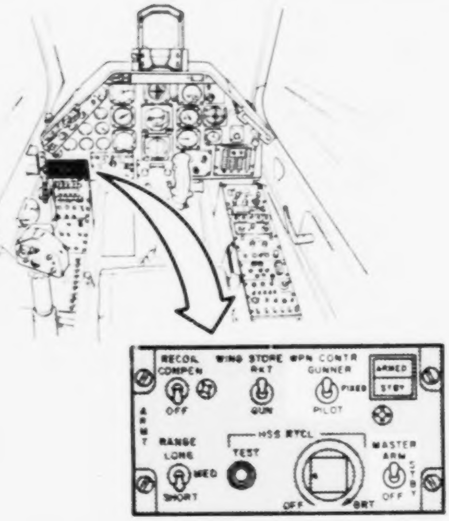
W2P1 AND W3J1

ARR82 25326

TELESCOPIC SIGHT UNIT (TSU) INTERFACE AND PROXIMITY SWITCH CHECKS

CAUTION

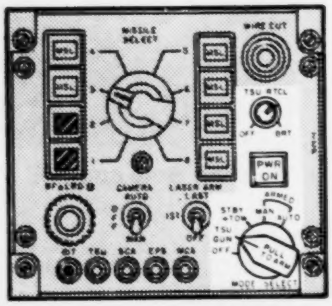
A failure in the depression limit circuit or other elevation drive train failures may result in the gun barrels striking the ground. Exercise care when performing this check. Be prepared to pull TURRET DRIVE MOTOR circuit breaker in the event of failure.


RECOIL COMPEN
OFF
ARMT
WING STORE
RKT
GUN
WPN CONTR
GUNNER
FIXED
PILOT
ARMED
STBY
RANGE
LONG
MED
SHORT
HSS RTCL
TEST
OFF
BRT
MASTER ARM
STBY
OFF

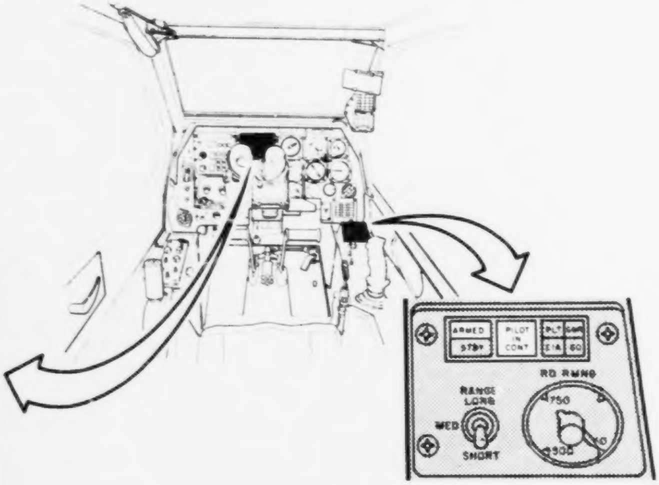
PILOT ARMAMENT CONTROL PANEL

51. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO ARM.
    a. Turret in fixed forward.
    b. PILOT IN CONT indicator lights on GUNNER ARMAMENT CONTROL PANEL.
52. ON PILOT ARMAMENT CONTROL PANEL, SET WPN CONTR SWITCH TO GUNNER.
    a. Turret moves to stow position.
    b. PILOT IN CONT indicator out.
53. ON TOW CONTROL PANEL, SET MODE SELECT SWITCH TO TSU GUN AND TSU RTCL TO BRT.

    System status annunciator indicates TEST and after approximately two minutes indicates PWR ON.


MISSILE SELECT
MSL
WIRE CUT
TSU RTCL
OFF
BRT
PWR ON
CAMERA
LASER ARM
ARMED
STBY
TOW
MAN
AUTO
TSU GUN
OFF
PULL TO ARM
MODE SELECT

TOW CONTROL PANEL


ARMED
STBY
PILOT IN CONT
PLT
RD RMNG
RANGE
LONG
MED
SHORT
750
300

GUNNER ARMAMENT CONTROL PANEL

ARR82 25318

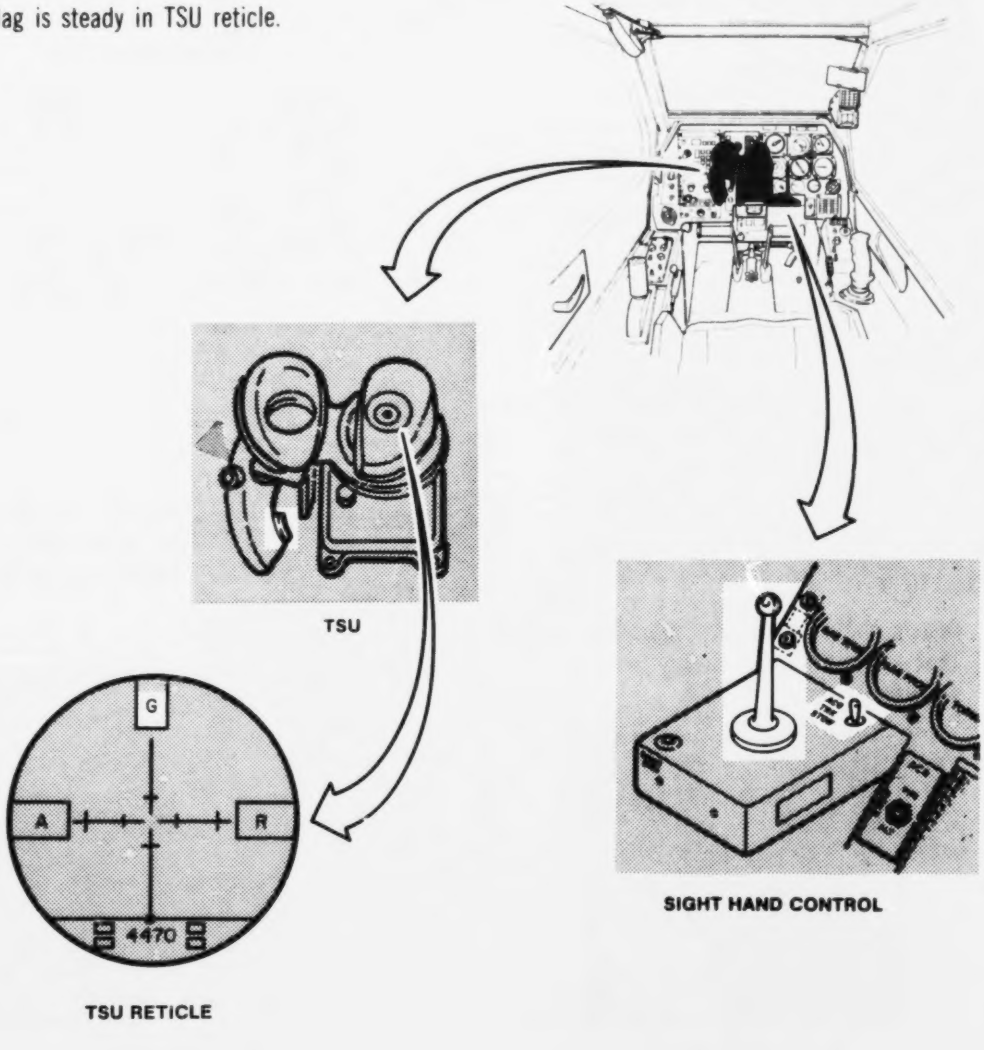
2-8. TURRET SUBSYSTEM PREOPERATIONAL CHECK (cont)

TELESCOPIC SIGHT UNIT (TSU) INTERFACE AND PROXIMITY SWITCH CHECKS (cont)

54. ON SIGHT HAND CONTROL, SET ACQ/TRK/STOW SWITCH TO TRK.

55. MANUALLY RETRACT GHS RETICLE. HOLD TSU TO APPROXIMATELY 0° AZ 0° EL WITH SIGHT HAND CONTROL.

56. ON TSU, PRESS LHG ACTION SWITCH.
    a. Turret alines with TSU.
    b. G flag is steady in TSU reticle.


TSU
G
A
R
4470
TSU RETICLE
SIGHT HAND CONTROL

ARR82-25319

TELESCOPIC SIGHT UNIT (TSU) INTERFACE AND PROXIMITY SWITCH CHECKS (cont)

NOTE

An observer should be in position to observe barrel cluster in next step.

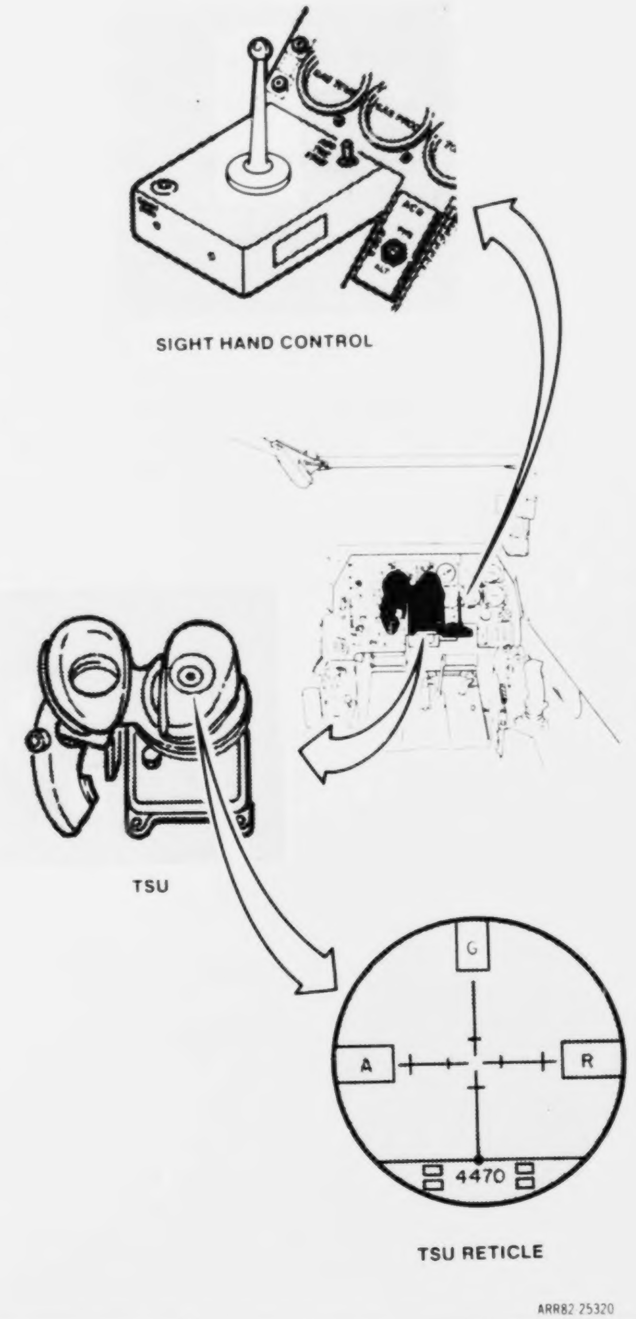
57. CAREFULLY DEPRESS TSU TO A POINT LOWER THAN -5° EL WITH SIGHT HAND CONTROL.
    a. Turret follows TSU to approximately -5° el then stops tracking TSU.
    b. G flag is in motion when turret stops tracking TSU.

58. WHILE TURRET IS AT APPROXIMATELY -5° EL POSITION, PRESS LHG TRIGGER SWITCH.

    M197 gun does not rotate.

59. MOVE TSU UP UNTIL G FLAG IS STEADY.
    a. Turret tracks TSU out of -5° el.
    b. M197 gun rotates.
    c. Feeder sprockets turn.

60. ON TSU, RELEASE LHG TRIGGER SWITCH AND ACTION SWITCH.
    a. M197 gun stops rotating.
    b. Turret returns to stow position.



2-8. TURRET SUBSYSTEM PREOPERATIONAL CHECK (cont)

TELESCOPIC SIGHT UNIT (TSU) INTERFACE AND PROXIMITY SWITCH CHECKS (cont)

61. ON GUNNER ARMAMENT CONTROL PANEL, SET TUR SLEW SWITCH TO NORM.

62. ON TSU, PRESS LHG ACTION SWITCH.

    Turret alines with TSU at high rate.

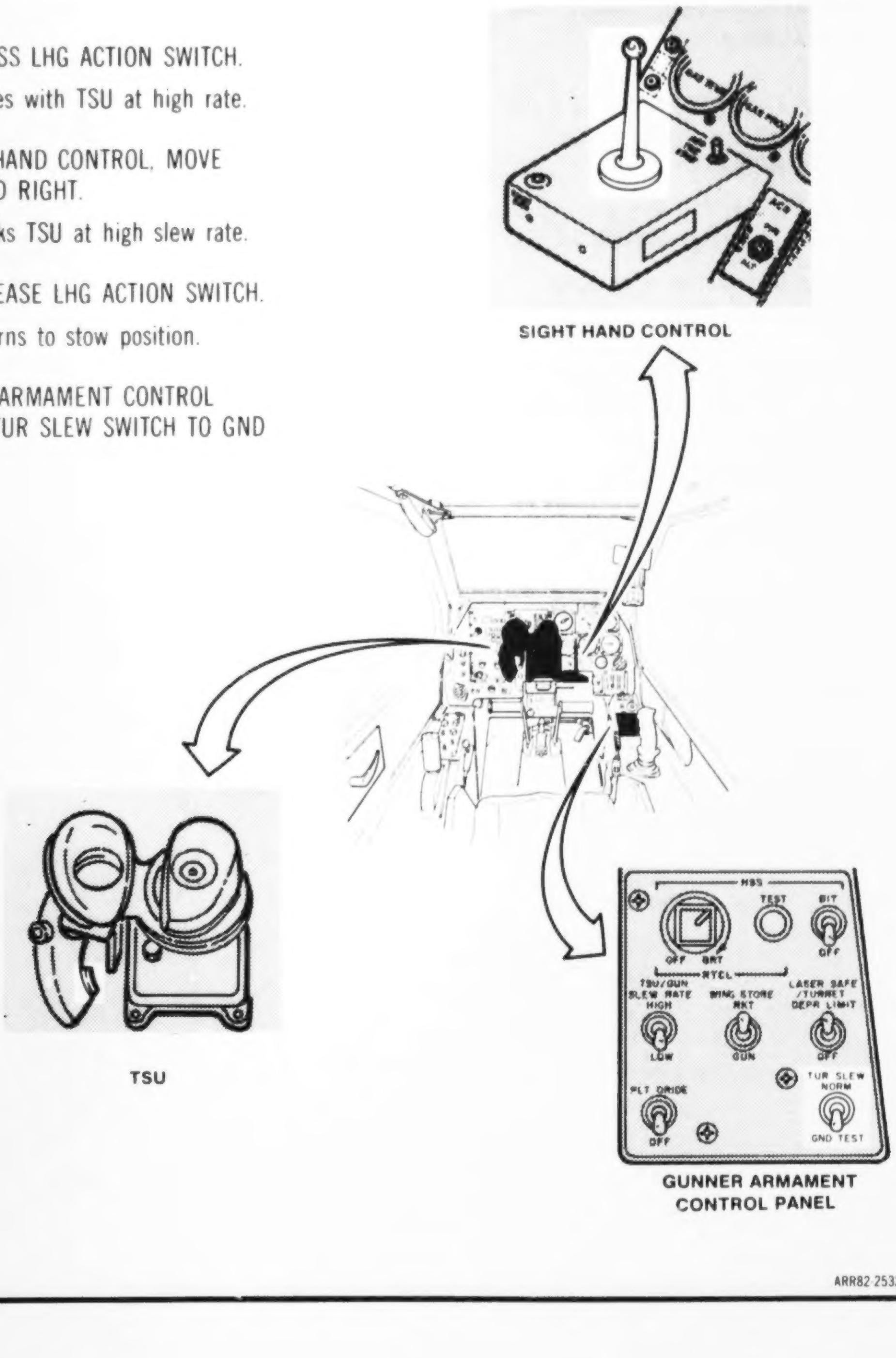
63. WITH SIGHT HAND CONTROL, MOVE TSU LEFT AND RIGHT.

    Turret tracks TSU at high slew rate.

64. ON TSU, RELEASE LHG ACTION SWITCH.

    Turret returns to stow position.

65. ON GUNNER ARMAMENT CONTROL PANEL, SET TUR SLEW SWITCH TO GND TEST.


SIGHT HAND CONTROL
TSU
HSS
TEST
BIT
OFF
BRT
OFF
RTCL
TSU/GUN SLEW RATE HIGH
LOW
WING STORE RKT
GUN
LASER SAFE /TURRET DEPR LIMIT
OFF
TUR SLEW NORM
GND TEST
PLT ORIDE
OFF
GUNNER ARMAMENT CONTROL PANEL

ARR82 25321

TELESCOPIC SIGHT UNIT (TSU) INTERFACE AND PROXIMITY SWITCH CHECKS (cont)

66. WITH SIGHT HAND CONTROL ON SIGHT HAND CONTROL, MOVE TSU TO 0° AZ 0° EL.

67. ON TSU, PRESS LHG ACTION SWITCH.

    Turret alines with TSU.

68. MOVE TSU TO LEFT LIMIT.

    a. Turret stops driving at limit.

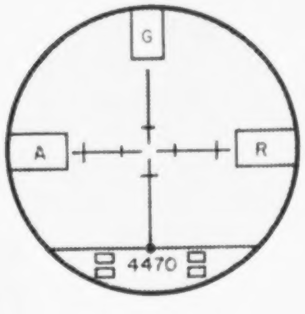
    b. G flag is in motion when turret stops tracking TSU.

69. ON TSU, RELEASE LHG ACTION SWITCH.

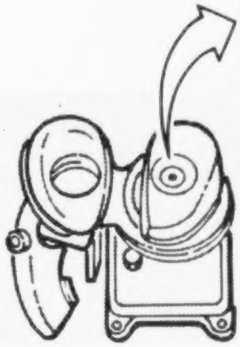
    Turret returns to stow position.

70. REPEAT STEPS 66 THRU 69 FOR RIGHT AND UP LIMITS.

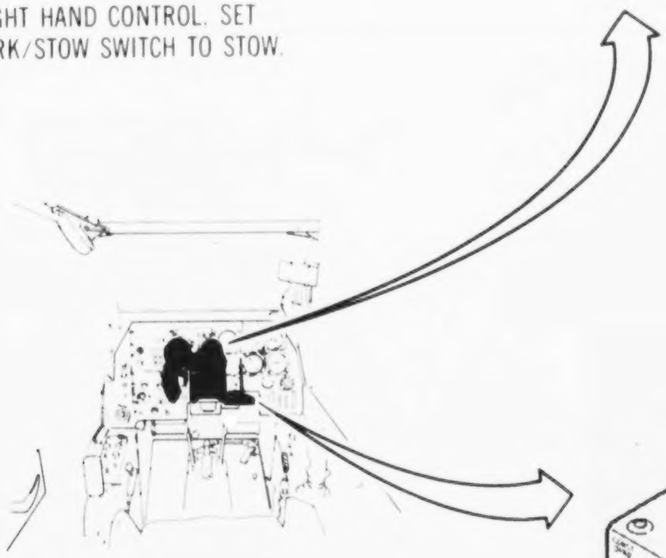
71. ON SIGHT HAND CONTROL, SET ACQ/TRK/STOW SWITCH TO STOW.

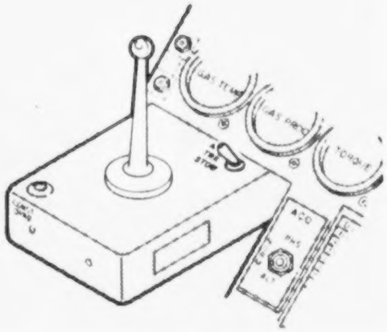


TSU RETICLE



TSU





SIGHT HAND CONTROL

ARR82 25322

2-8. TURRET SUBSYSTEM PREOPERATIONAL CHECK (cont)

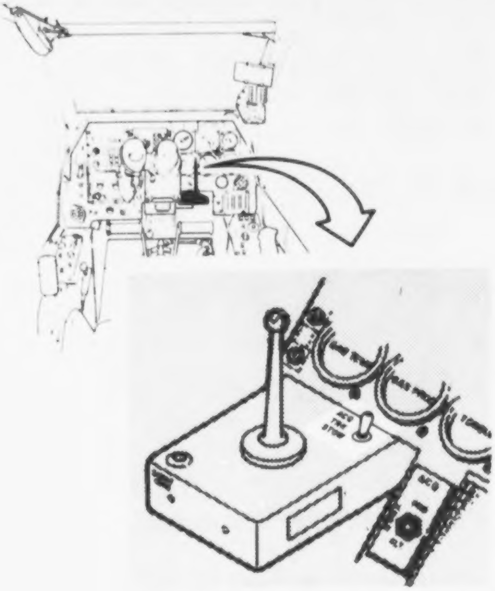
ACQUISITION CHECK

72. POSITION GHS RETICLE TO A SIGHTING POSITION AND ON SIGHT HAND CONTROL, HOLD ACQ/TRK/STOW SWITCH TO ACQ AND MOVE GHS UP, DOWN, LEFT, AND RIGHT.

    a. TSU tracks GHS.

    b. Release ACQ/TRK/STOW switch.

    c. GHS reticle retracts.



SIGHT HAND CONTROL

ARR92 25262

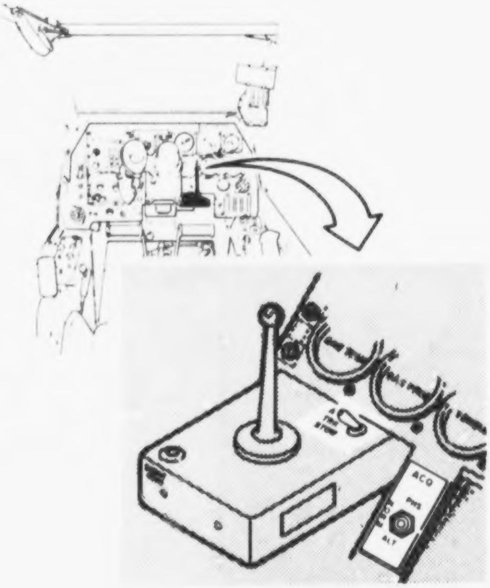
73. POSITION PILOT HELMET SIGHT RETICLE TO A SIGHTING POSITION AND ON ACQ PANEL, HOLD PHS/NORM/ALT SWITCH TO PHS AND MOVE PHS UP, DOWN, LEFT, AND RIGHT.

    a. TSU tracks PHS.

    b. Release PHS ACQ switch.

    c. GHS reticle retracts.

74. ON SIGHT HAND CONTROL SET ACQ/TRK/STOW SWITCH TO STOW.



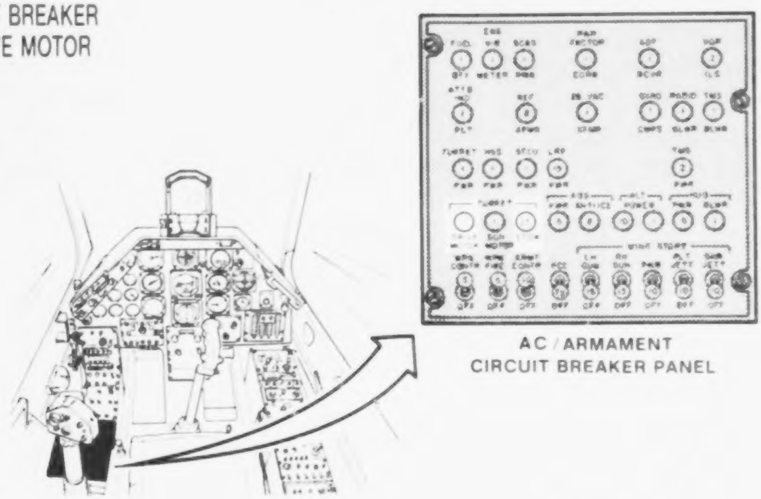
SIGHT HAND CONTROL

ARR82-25263

EMERGENCY STOW

75. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, CHECK THAT TURRET STOW CIRCUIT BREAKER IS OPEN.

76. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, OPEN TURRET DRIVE MOTOR CIRCUIT BREAKER.



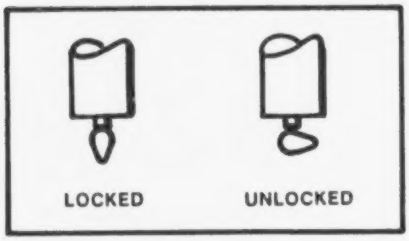
AC / ARMAMENT CIRCUIT BREAKER PANEL

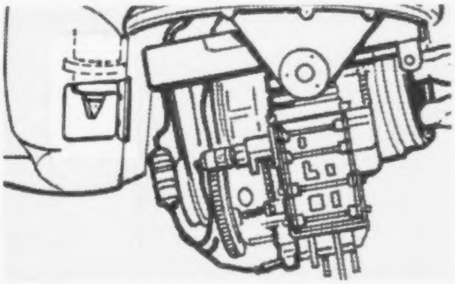
ARR82-25327

CAUTION

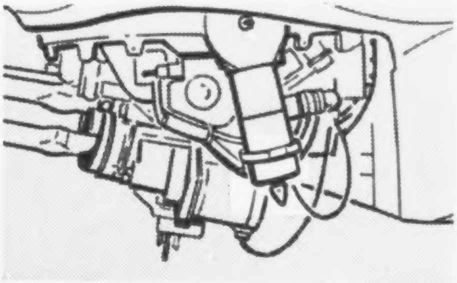
Make sure barrels are supported to prevent barrels from striking ground.

77. SET ELEVATION AND AZIMUTH DRIVE MOTOR BRAKE HANDLES TO UNLOCKED POSITION.





AZIMUTH DRIVE MOTOR BRAKE HANDLE



ELEVATION DRIVE MOTOR BRAKE HANDLE

ARR82-25282

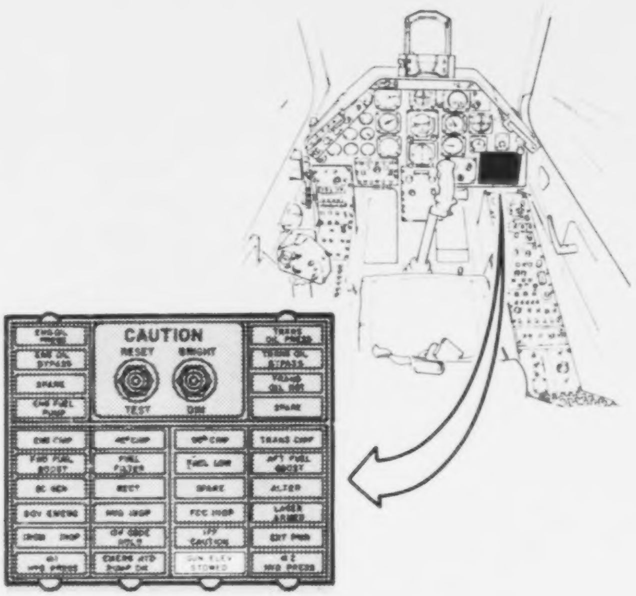
2-8. TURRET SUBSYSTEM PREOPERATIONAL CHECK (cont)

EMERGENCY STOW (cont)

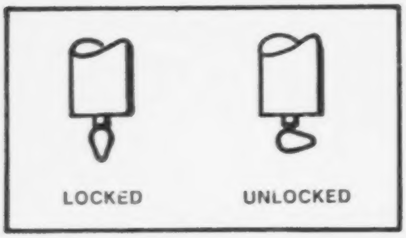
78. MANUALLY POSITION TURRET TO RIGHT MECHANICAL LIMIT AND MAXIMUM DEPRESSION ALLOWABLE.

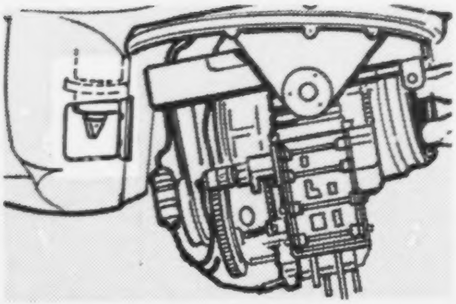
    On pilot caution panel, GUN ELEV STOWED indicator out.

79. SET ELEVATION AND AZIMUTH DRIVE MOTOR BRAKE HANDLES TO LOCKED POSITION.

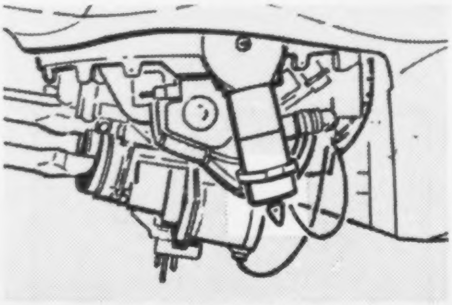

CAUTION
RESET
BRIGHT
TEST
DIM
SPARE
TRANS CHIP
FUEL LOW
SPARE
ALTER
SPARE
GUN ELEV STOWED

PILOT CAUTION PANEL


LOCKED
UNLOCKED



AZIMUTH DRIVE MOTOR
BRAKE HANDLE



ELEVATION DRIVE MOTOR
BRAKE HANDLE

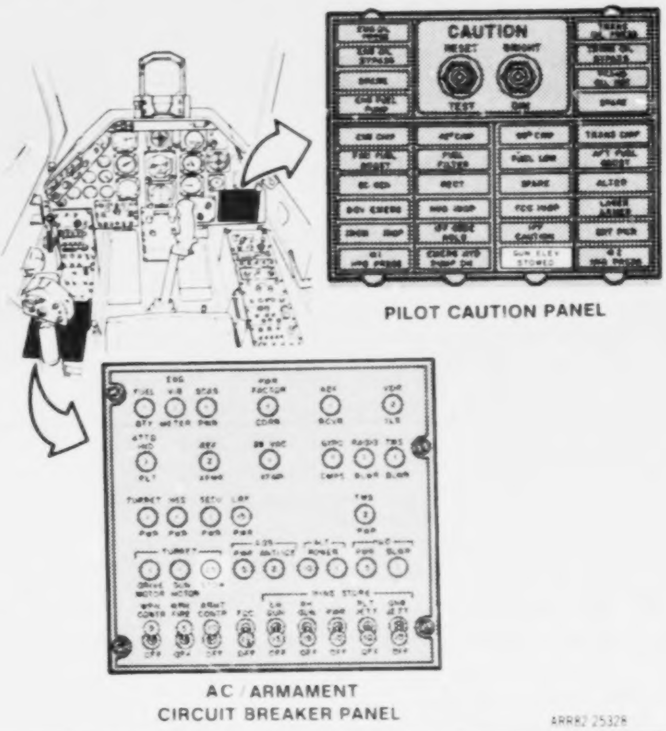
ARR82-25283

EMERGENCY STOW (cont)

CAUTION

Do not leave turret stow circuit breaker closed for more than 10 seconds if turret fails to move to stow position. Damage to emergency stow control unit may occur.

80. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, CLOSE TURRET STOW CIRCUIT BREAKER.
    a. Turret moves to stow position.
    b. On pilot caution panel, GUN ELEV STOWED indicator lights.
81. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, OPEN TURRET STOW CIRCUIT BREAKER.



PILOT CAUTION PANEL

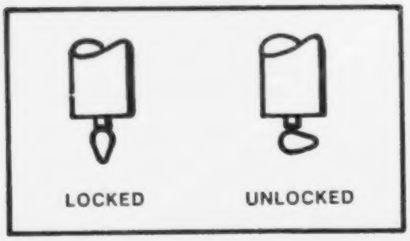
AC / ARMAMENT CIRCUIT BREAKER PANEL

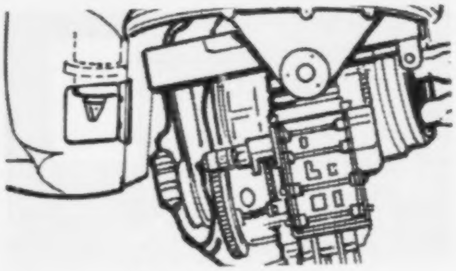
ARR82 25328

CAUTION

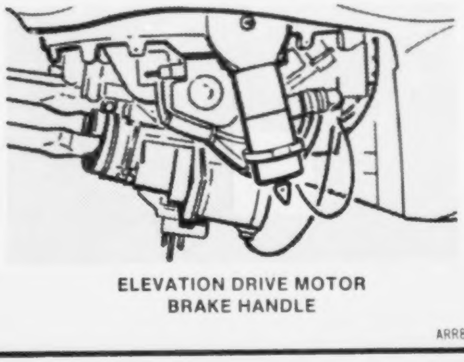
Make sure barrels are supported to prevent barrels from striking ground.

82. SET ELEVATION AND AZIMUTH DRIVE MOTOR BRAKE HANDLES TO UNLOCKED POSITION.





AZIMUTH DRIVE MOTOR BRAKE HANDLE



ELEVATION DRIVE MOTOR BRAKE HANDLE

ARR82 25251

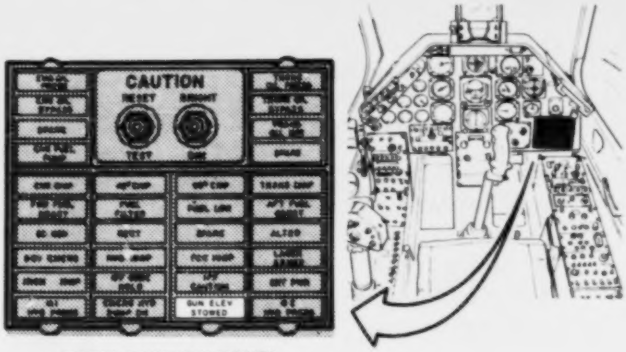
2-8. TURRET SUBSYSTEM PREOPERATIONAL CHECK (cont)

EMERGENCY STOW (cont)

83. MANUALLY POSITION TURRET TO LEFT MECHANICAL LIMIT AND MAXIMUM DEPRESSION ALLOWABLE.

    GUN ELEV STOWED indicator out.

84. SET ELEVATION AND AZIMUTH DRIVE MOTOR BRAKE HANDLES TO LOCKED POSITION.


CAUTION
RESET
BRIGHT
TEST
DIM
GUN ELEV STOWED

PILOT CAUTION PANEL

ARR82-25286

CAUTION

Do not leave turret stow circuit breaker closed for more than 10 seconds if turret fails to move to stow position. Damage to emergency stow control unit may occur.

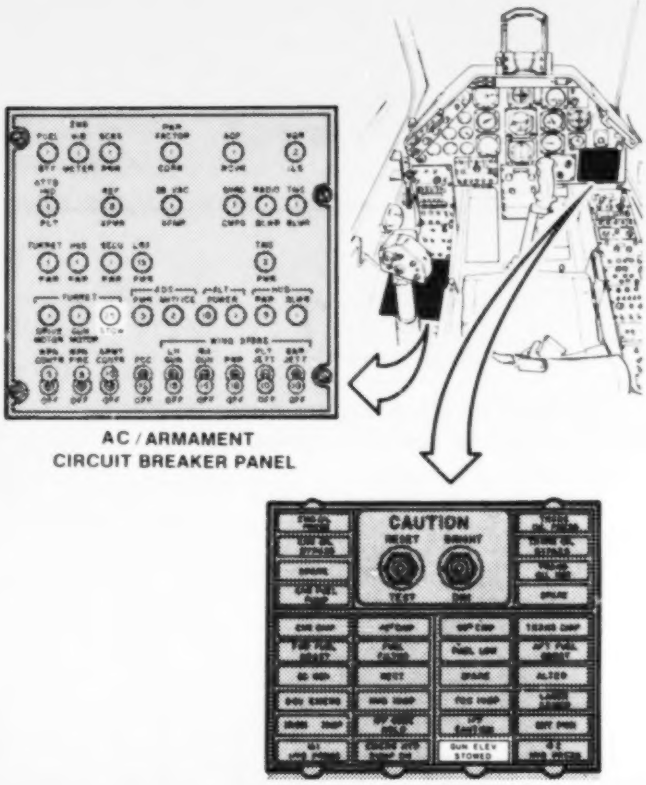
85. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, CLOSE TURRET STOW CIRCUIT BREAKER.

    a. Turret moves to stow position.

    b. On pilot caution panel, GUN ELEV STOWED indicator lights.

86. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, OPEN TURRET STOW CIRCUIT BREAKER.

87. REMOVE POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL PARA 2-7.


TURRET
STOW
CAUTION
RESET
BRIGHT
TEST
DIM
GUN ELEV STOWED

AC / ARMAMENT CIRCUIT BREAKER PANEL

PILOT CAUTION PANEL

ARR82-25329

END OF TASK

2-9. QUICK CHECK BORESIGHT

DESCRIPTION

This task covers: A quick check of weapon baseline to sight optics to determine whether or not the turret subsystem must be boresighted.

INITIAL SETUP

Tools/Test and Support Equipment:
Tool Set, A/C Armament
Repairman: Basic
Tool Set, A/C Armament
Repairman: Supplemental
Universal Boresight Kit

Personnel Required: (3)
68J Aircraft Fire Control Repairer/
68M Aircraft Weapon Systems Repairer

Equipment Conditions:
HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP performed, para 2-6.
Muzzle clamp properly torqued to 63 — 79 lb-ft. (85 — 107 N.m)
TSU window cover removed.
Helicopter parked within sight of three targets at least one mile away. These targets should be at approximately 0°, 90° right, and 90° left. There is no need to level the helicopter as long as the targets can be seen through the borescope when the turret is moved in azimuth.
HSS installed and helmets available.

CAUTION

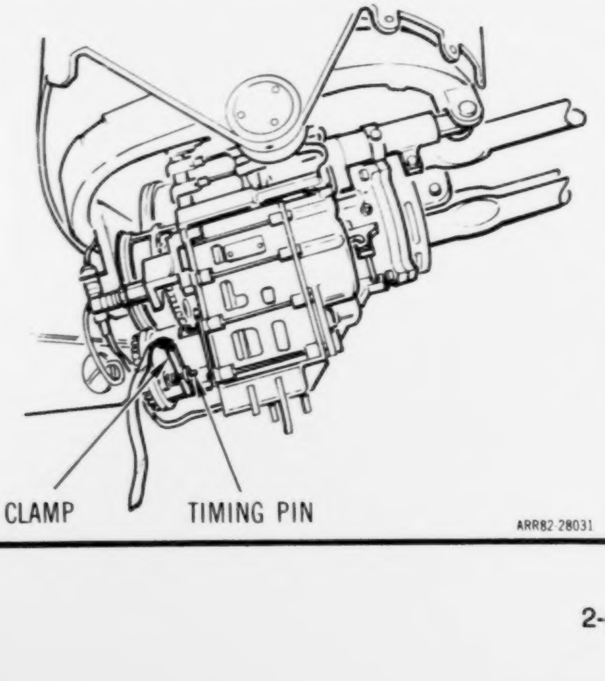
A boresight telescope and adapter from the universal boresight kit are used in this task, remove them prior to moving turret in any mode.

QUICK CHECK BORESIGHT

NOTE

Use barrel locked in firing position for all boresight checks.

1. ON M89E1 FEEDER, CLAMP TIMING PIN IN DEPRESSED POSITION.

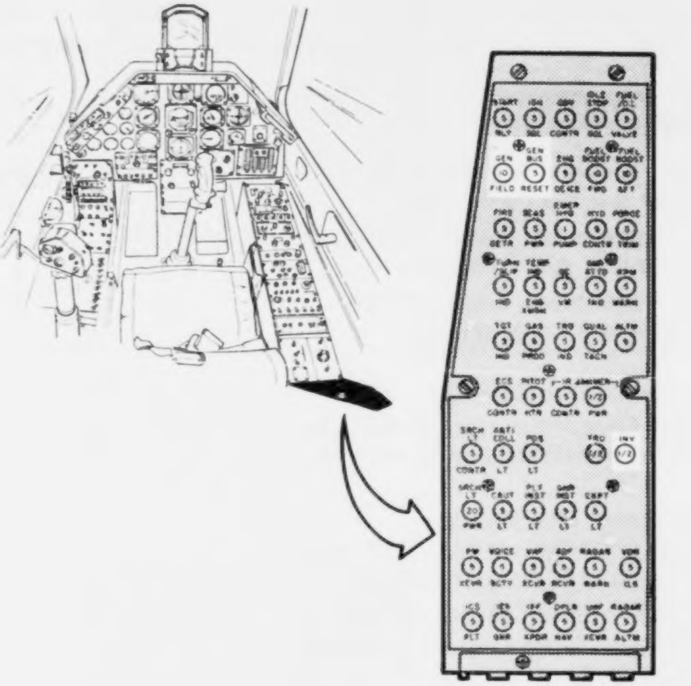


2-9. QUICK CHECK BORESIGHT (cont)

QUICK CHECK BORESIGHT (cont)

2. APPLY POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.

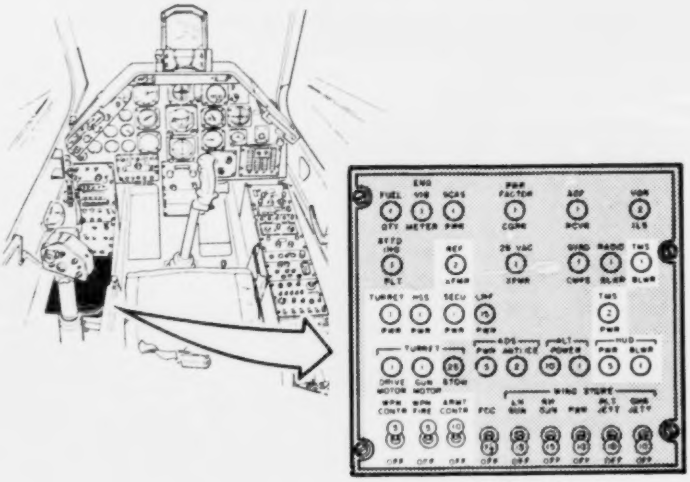
3. CLOSE FOLLOWING CIRCUIT BREAKERS ON DC CIRCUIT BREAKER PANEL:
   - GEN FIELD
   - GEN BUS RESET
   - INV


GEN
10
FIELD
GEN
BUS
5
RESET
COLL
ECS
CONTR
FIELD
20
PWR
INV
1/2
QUAL
TACH
VOICE
RADAR
ALTM
XPDR
PLT

DC CIRCUIT BREAKER PANEL

ARR82-28032

4. CLOSE FOLLOWING CIRCUIT BREAKERS ON AC/ARMAMENT CIRCUIT BREAKER PANEL:
   - REF XFMR
   - TMS BLWR
   - TURRET PWR
   - HSS PWR
   - SECU PWR
   - TMS PWR
   - TURRET DRIVE MOTOR
   - TURRET GUN MOTOR
   - HUD PWR
   - HUD BLWR
   - WPN CONTR
   - WPN FIRE
   - ARMT CONTR

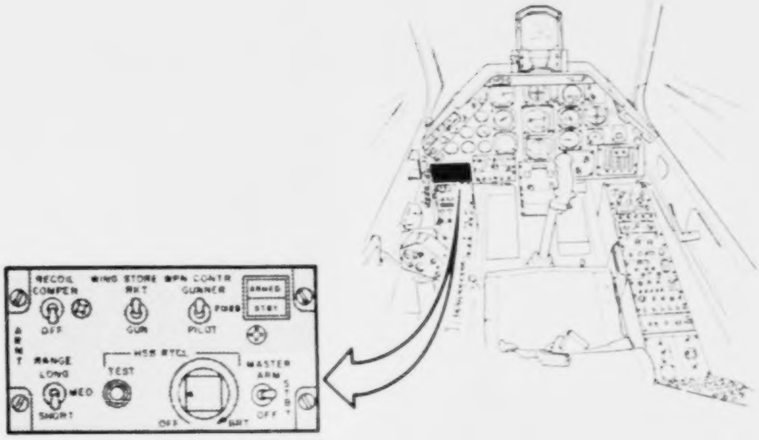

FUEL
QTY
ENG
METER
PWR
FACTOR
ADF
RCVR
VOR
ILS
REF
XFMR
26 VAC
XFMR
RADIO
BLWR
TMS
BLWR
TURRET
PWR
HSS
PWR
SECU
PWR
UHF
PWR
TMS
2
PWR
TURRET
DRIVE
MOTOR
GUN
MOTOR
STOW
ADS
PWR
ANTI ICE
ALT
POWER
HUD
PWR
BLWR
WING STORE
WPN
CONTR
WPN
FIRE
ARMT
CONTR
FCC
LH
GUN
RH
GUN
PWR
JETT
OFF

AC / ARMAMENT CIRCUIT BREAKER PANEL

ARR82-28033

QUICK CHECK BORESIGHT (cont)

5. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO STBY.


RECOIL COMPEN
WING STORE RKT
WPN CONTR GUNNER
ARMED
STBY
OFF
GUN
FIXED
PILOT
ARMT
RANGE
LONG
MED
SHORT
HSS RTCL
TEST
MASTER ARM
STBY
OFF
OFF
BRT

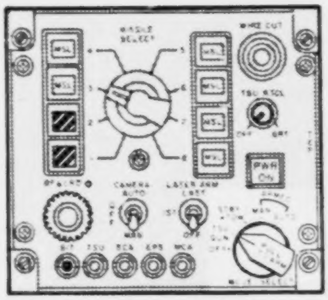
PILOT ARMAMENT CONTROL PANEL

ARR82-28034

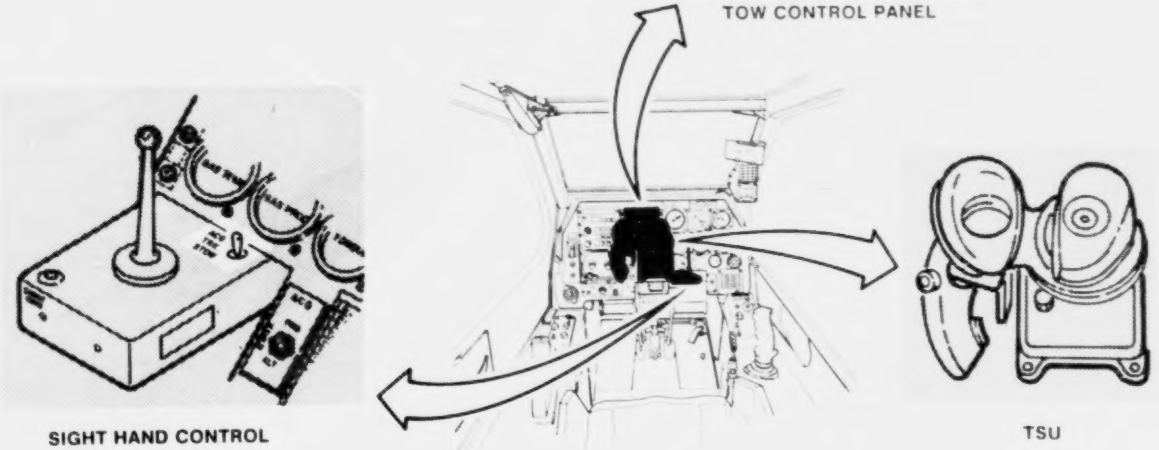
6. ON TOW CONTROL PANEL, SET MODE SELECT SWITCH TO TSU/GUN.

7. ON SIGHT HAND CONTROL SET ACQ/TRK/STOW SWITCH TO TRK.

8. ON TSU, SET HI/LOW MAG SWITCH TO HI.


MISSILE SELECT
WIRE CUT
MSL
TSU RTCL
PWR ON
CAMERA AUTO
LATER ARM
MODE SELECT

TOW CONTROL PANEL



SIGHT HAND CONTROL

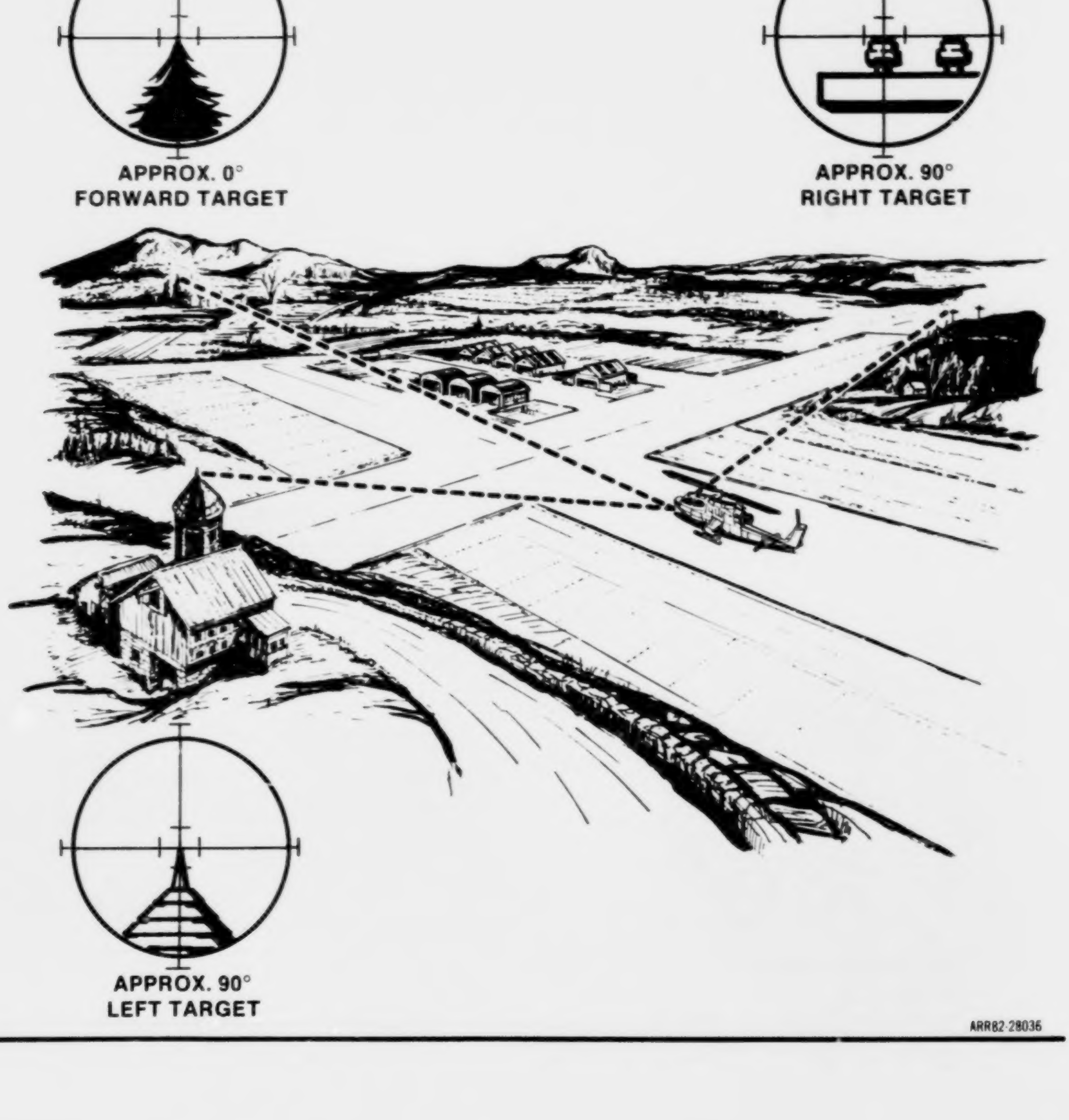
TSU

ARR82-28035

2-9. QUICK CHECK BORESIGHT (cont)

QUICK CHECK BORESIGHT (cont)

9. VERIFY FORWARD, LEFT, AND RIGHT TARGETS ARE VISIBLE THROUGH TSU BY ALINING TSU LOS TO TARGETS USING SIGHT HAND CONTROL.


APPROX. 0°
FORWARD TARGET
APPROX. 90°
RIGHT TARGET
APPROX. 90°
LEFT TARGET
ARR82-28036

QUICK CHECK BORESIGHT (cont)

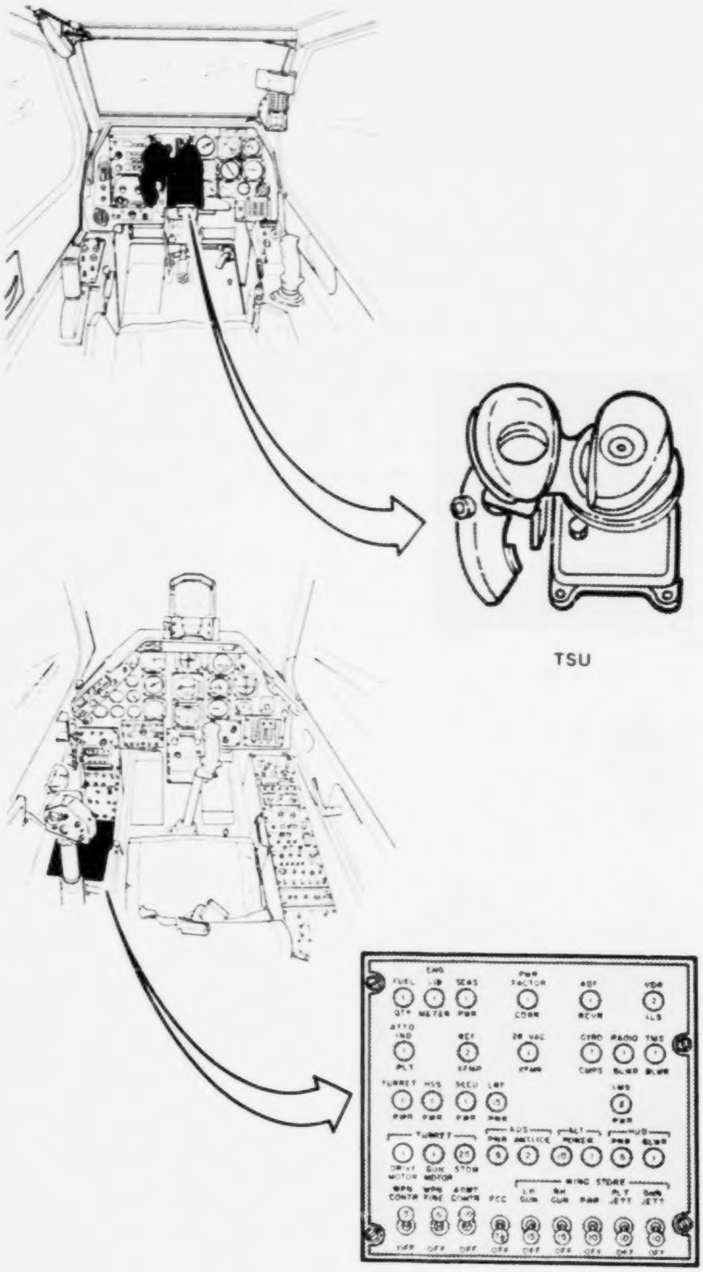
10. ALINE TSU LOS WITH FORWARD TARGET.

11. ON TSU, PRESS LHG ACTION SWITCH.

    Turret alines with TSU LOS.

12. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, OPEN TURRET DRIVE MOTOR CIRCUIT BREAKER.

13. RELEASE LHG ACTION SWITCH.



TSU

AC / ARMAMENT CIRCUIT BREAKER PANEL

ARR82 28037

2-9. QUICK CHECK BORESIGHT (cont)

QUICK CHECK BORESIGHT (cont)

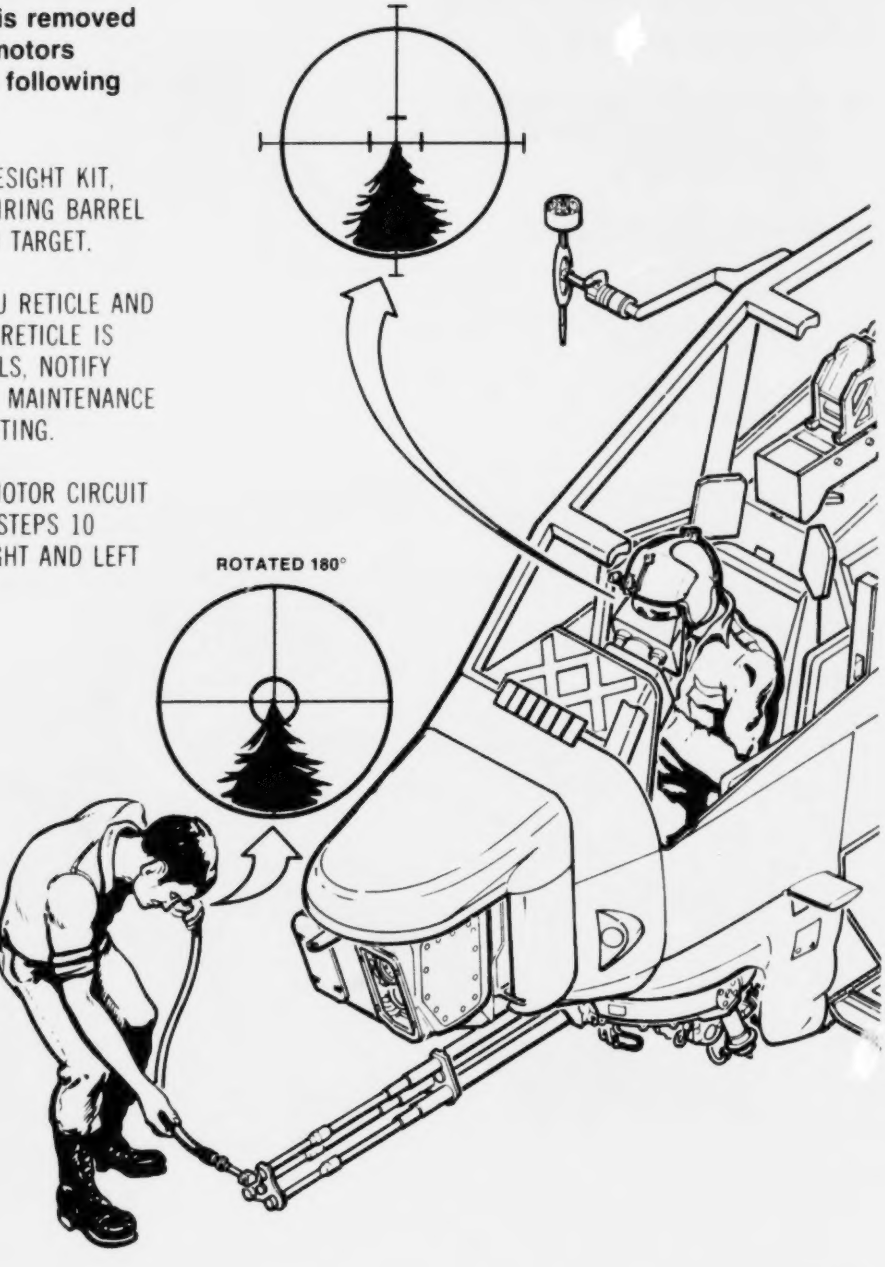
WARNING

Verify that power is removed from turret drive motors before performing following step.

14. USING UNIVERSAL BORESIGHT KIT, CHECK THAT WEAPON FIRING BARREL IS ALINED TO FORWARD TARGET.

15. IF OFFSET BETWEEN TSU RETICLE AND BORESIGHT TELESCOPE RETICLE IS GREATER THAN FIVE MILS, NOTIFY NEXT HIGHER LEVEL OF MAINTENANCE TO PERFORM BORESIGHTING.

16. CLOSE TURRET DRIVE MOTOR CIRCUIT BREAKER AND REPEAT STEPS 10 THROUGH 15 USING RIGHT AND LEFT TARGETS.

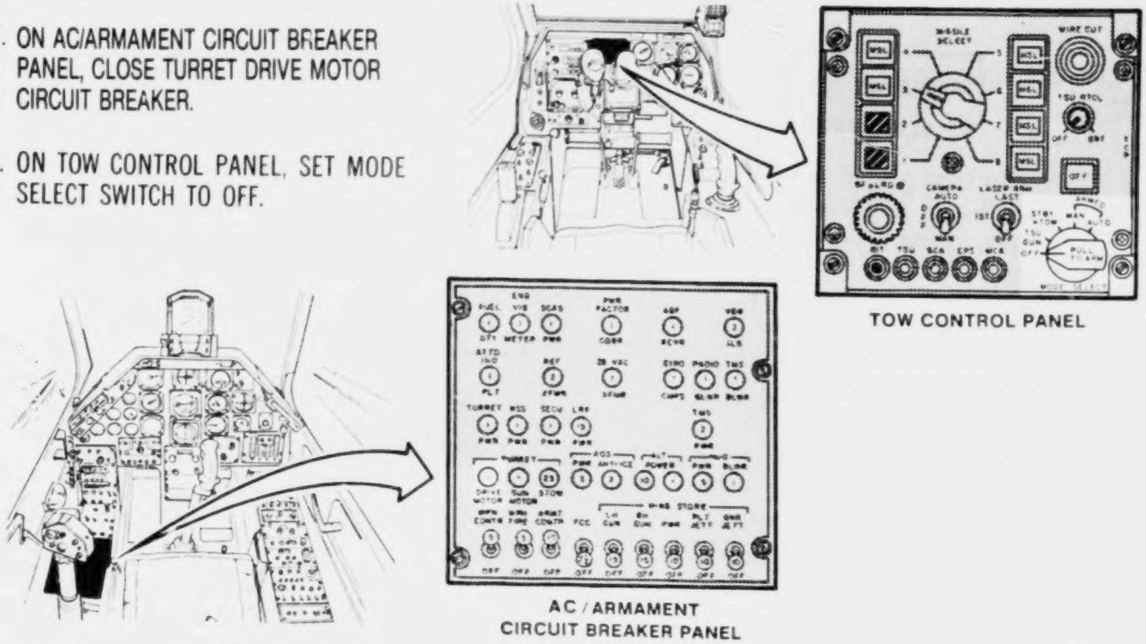


ARR82-28038

QUICK CHECK BORESIGHT (cont)

17. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, CLOSE TURRET DRIVE MOTOR CIRCUIT BREAKER.

18. ON TOW CONTROL PANEL, SET MODE SELECT SWITCH TO OFF.


MISSILE SELECT
MSL
WIRE CUT
TSU RTCL
OFF
BRT
CAMERA AUTO
MAN
LASER RNG
LAST
1ST
OFF
STBY
TOW
MAN
AUTO
ARMED
TSU
GUN
OFF
PULL TO ARM
MODE SELECT
TSU
SCA
EPS
MCA
FUEL QTY
ENG VIB METER
SCAS PWR
PWR FACTOR CORR
ADF RCVR
VOR ILS
ATTD IND PLT
REF
28 VAC
GYRO CMPS
RADIO
TMS
TURRET PWR
HSS PWR
SECU PWR
LRF PWR
TMS PWR
TURRET
DRIVE MOTOR
GUN MOTOR
STOW
AOS
PWR
ANTI-ICE
POWER
PWR
BLWR
WPN CONTR
WPN FIRE
ARMT CONTR
FCC
WING STORE
LH GUN
RH GUN
PWR
PLT JETT
GNR JETT
OFF

TOW CONTROL PANEL

AC / ARMAMENT
CIRCUIT BREAKER PANEL

ARR82 28039

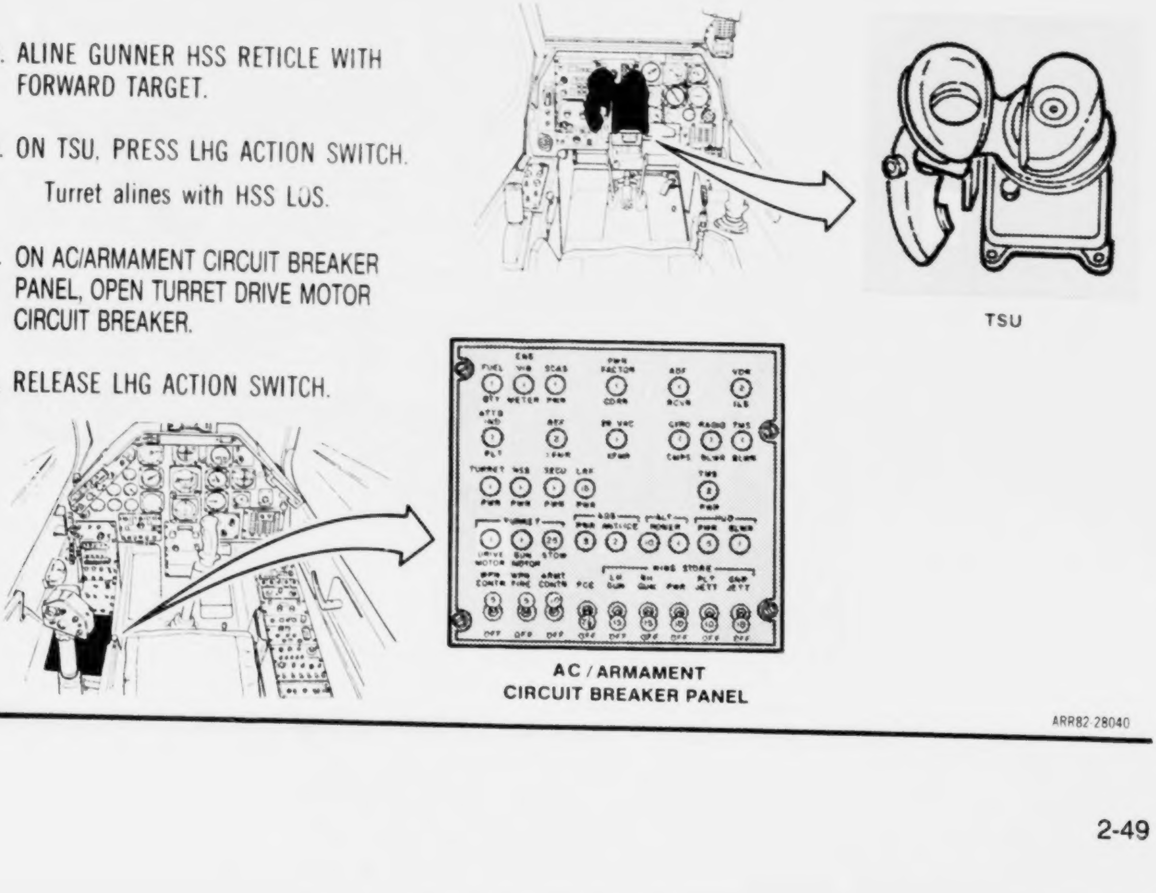
19. ALINE GUNNER HSS RETICLE WITH FORWARD TARGET.

20. ON TSU, PRESS LHG ACTION SWITCH.

    Turret alines with HSS LOS.

21. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, OPEN TURRET DRIVE MOTOR CIRCUIT BREAKER.

22. RELEASE LHG ACTION SWITCH.


FUEL QTY
ENG VIB METER
SCAS PWR
PWR FACTOR CORR
ADF RCVR
VOR ILS
ATTD IND PLT
REF
28 VAC
GYRO CMPS
RADIO
TMS
TURRET PWR
HSS PWR
SECU PWR
LRF PWR
TMS PWR
TURRET
DRIVE MOTOR
GUN MOTOR
STOW
AOS
PWR
ANTI-ICE
POWER
PWR
BLWR
WPN CONTR
WPN FIRE
ARMT CONTR
FCC
WING STORE
LH GUN
RH GUN
PWR
PLT JETT
GNR JETT
OFF

TSU

AC / ARMAMENT
CIRCUIT BREAKER PANEL

ARR82-28040

2-9. QUICK CHECK BORESIGHT (cont)

QUICK CHECK BORESIGHT (cont)

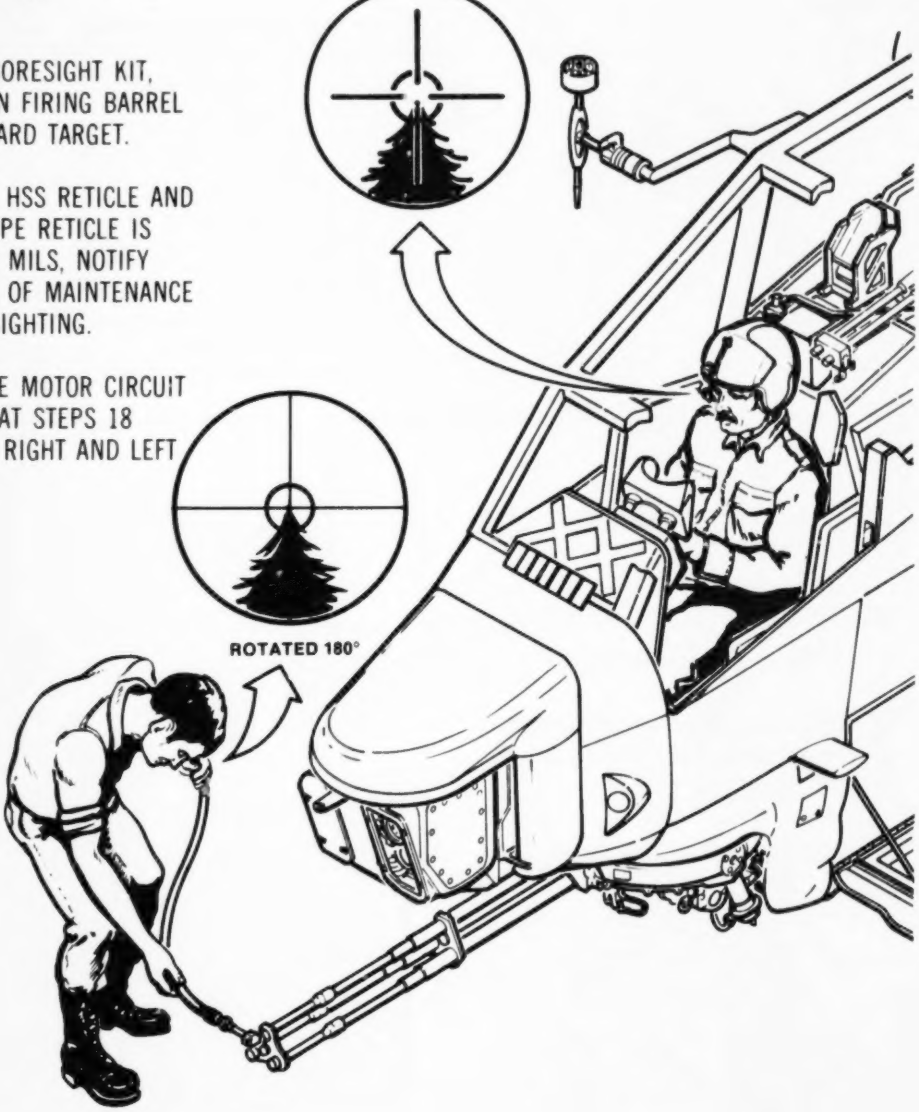
WARNING

Verify that power is removed from turret drive motors before performing foilowing step.

23. USING UNIVERSAL BORESIGHT KIT, CHECK THAT WEAPON FIRING BARREL IS ALINED TO FORWARD TARGET.

24. IF OFFSET BETWEEN HSS RETICLE AND BORESIGHT TELESCOPE RETICLE IS GREATER THAN FIVE MILS, NOTIFY NEXT HIGHER LEVEL OF MAINTENANCE TO PERFORM BORESIGHTING.

25. CLOSE TURRET DRIVE MOTOR CIRCUIT BREAKER AND REPEAT STEPS 18 THROUGH 24 USING RIGHT AND LEFT TARGETS.

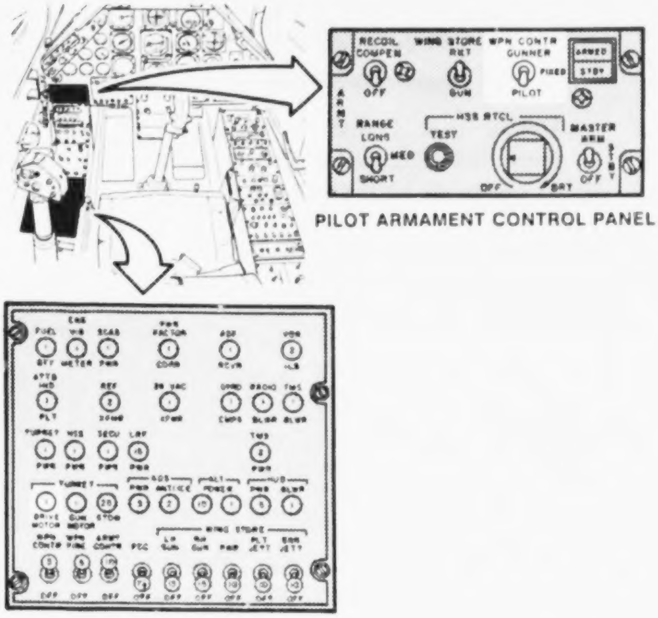


ARR82-28041

QUICK CHECK BORESIGHT (cont)

26. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, CLOSE TURRET DRIVE MOTOR CIRCUIT BREAKER.

27. ON PILOT ARMAMENT CONTROL PANEL, SET WPN CONTR SWITCH TO PILOT.


RECOIL COMPEN
OFF
WING STORE RKT
GUN
WPN CONTR GUNNER
FIXED
PILOT
ARMED
STBY
ARMT
RANGE
LONG
MED
SHORT
HSS RTCL
TEST
OFF
BRT
MASTER ARM
OFF
STBY
TURRET
DRIVE MOTOR
GUN MOTOR
WING STORE

PILOT ARMAMENT CONTROL PANEL

AC / ARMAMENT CIRCUIT BREAKER PANEL

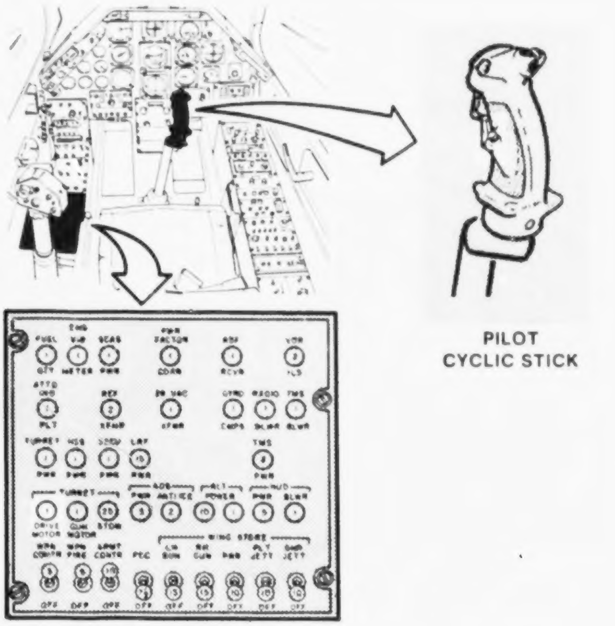
ARR82 28042

28. ALINE PILOT HSS RETICLE WITH FORWARD TARGET.

29. PRESS PILOT CYCLIC STICK ACTION SWITCH.

30. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, OPEN TURRET DRIVE MOTOR CIRCUIT BREAKER.

31. RELEASE PILOT CYCLIC STICK ACTION SWITCH.


TURRET
DRIVE MOTOR
GUN MOTOR
WING STORE

PILOT CYCLIC STICK

AC / ARMAMENT CIRCUIT BREAKER PANEL

ARR82 28043

2-9. QUICK CHECK BORESIGHT (cont)

QUICK CHECK BORESIGHT (cont)

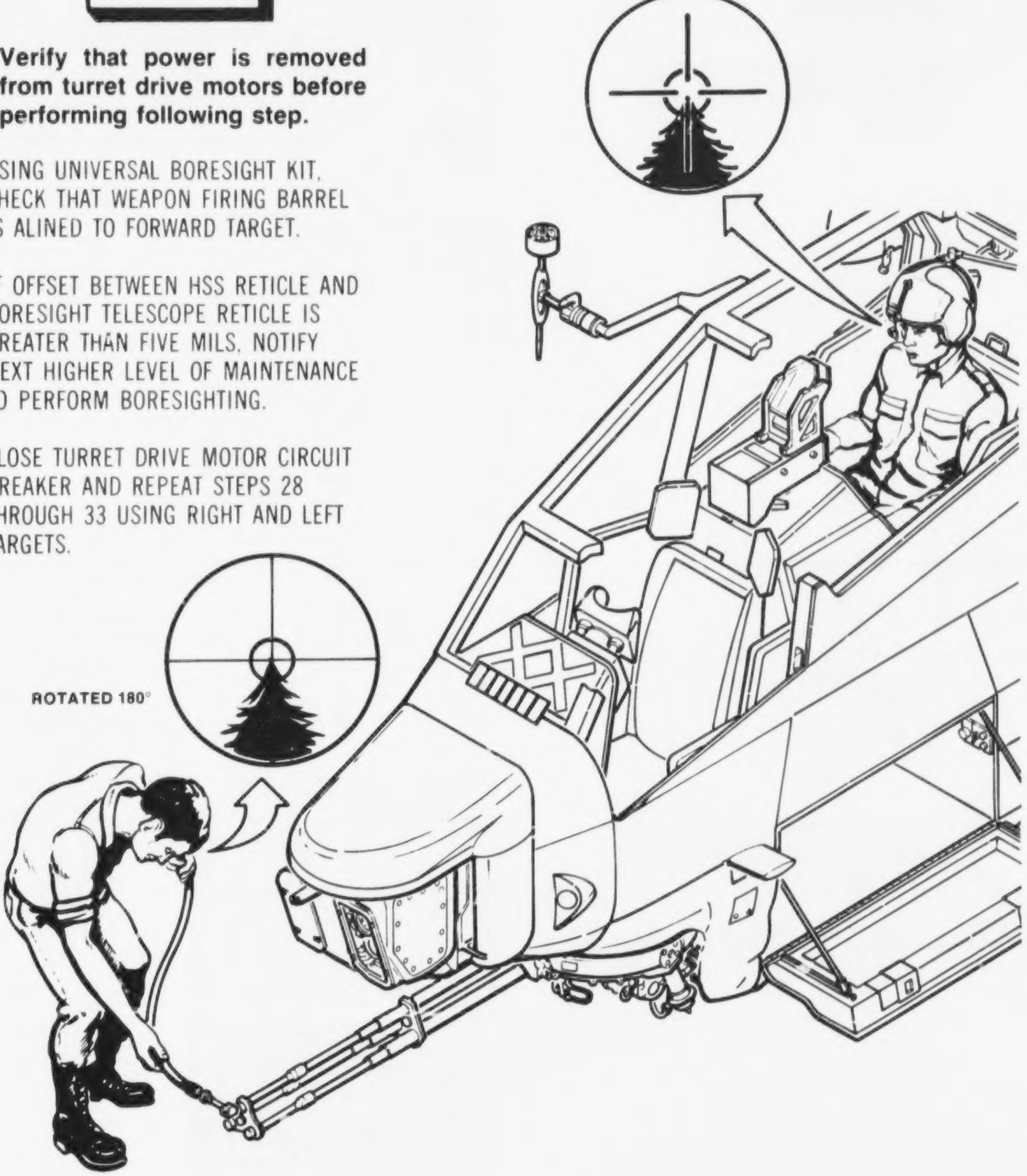
WARNING

Verify that power is removed from turret drive motors before performing following step.

32. USING UNIVERSAL BORESIGHT KIT, CHECK THAT WEAPON FIRING BARREL IS ALINED TO FORWARD TARGET.

33. IF OFFSET BETWEEN HSS RETICLE AND BORESIGHT TELESCOPE RETICLE IS GREATER THAN FIVE MILS, NOTIFY NEXT HIGHER LEVEL OF MAINTENANCE TO PERFORM BORESIGHTING.

34. CLOSE TURRET DRIVE MOTOR CIRCUIT BREAKER AND REPEAT STEPS 28 THROUGH 33 USING RIGHT AND LEFT TARGETS.



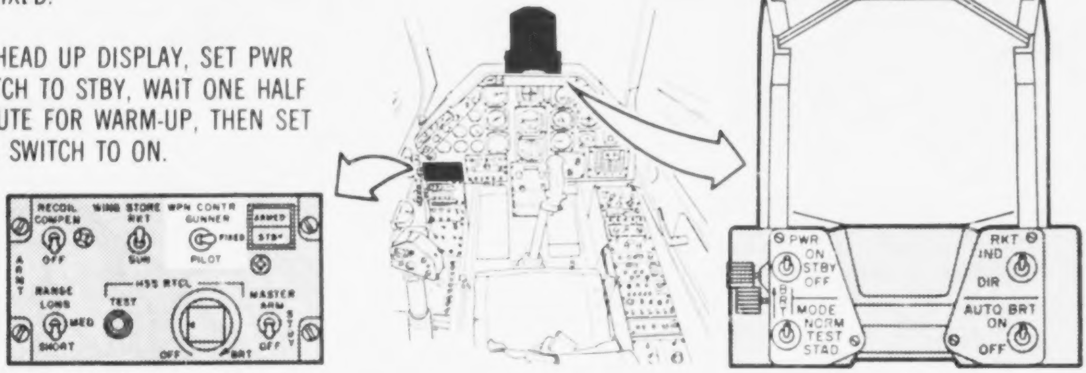
ARR82-28044

QUICK CHECK BORESIGHT (cont)

35. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, CLOSE TURRET DRIVE MOTOR CIRCUIT BREAKER.

36. ON PILOT ARMAMENT CONTROL PANEL, SET WPN CONTR SWITCH TO FIXFD.

37. ON HEAD UP DISPLAY, SET PWR SWITCH TO STBY, WAIT ONE HALF MINUTE FOR WARM-UP, THEN SET PWR SWITCH TO ON.

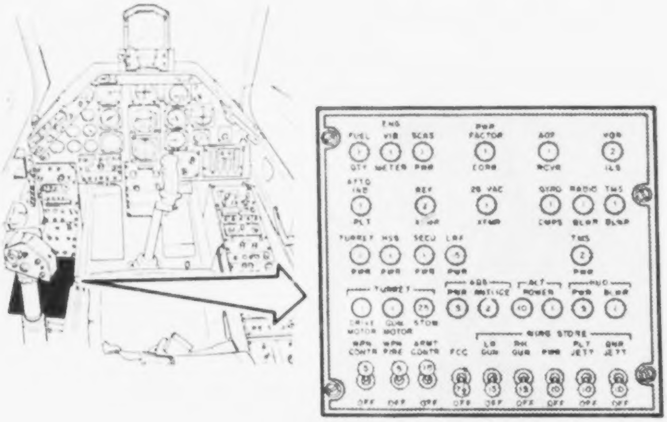

RECOIL COMPEN
OFF
WING STORE RKT
GUN
WPN CONTR
GUNNER
FIXED
PILOT
ARMED
STBY
ARMT
RANGE
LONG
MED
SHORT
HSS RTCL
TEST
OFF
BRT
MASTER ARM
STBY
OFF
PWR
ON
STBY
OFF
BRT
MODE
NORM
TEST
STAD
RKT
IND
DIR
AUTO BRT
ON
OFF

PILOT ARMAMENT CONTROL PANEL

HEAD UP DISPLAY

ARR82-28045

38. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, OPEN TURRET DRIVE MOTOR CIRCUIT BREAKER.


FUEL QTY
ENG VIB METER
SCAS PWR
PWR FACTOR CORR
ADF RCVR
VOR ILS
ATTD IND PLT
REF XFMR
28 VAC XFMR
GYRO CMPS
RADIO BLOR
TMS BLOR
TURRET PWR
HSS PWR
SECU PWR
LRF PWR
TMS PWR
TURRET
DRIVE MOTOR
GUN MOTOR
STOW
ADS
PWR
ANTI-ICE
ALT
POWER
HUD
PWR
BLOR
WING STORE
WPN CONTR
WPN FIRE
ARMT CONTR
FCC
LH GUN
RH GUN
PWR
PLT JETT
GNR JETT
OFF

AC / ARMAMENT
CIRCUIT BREAKER PANEL

ARR82-28046

2-9. QUICK CHECK BORESIGHT (cont)

QUICK CHECK BORESIGHT (cont)

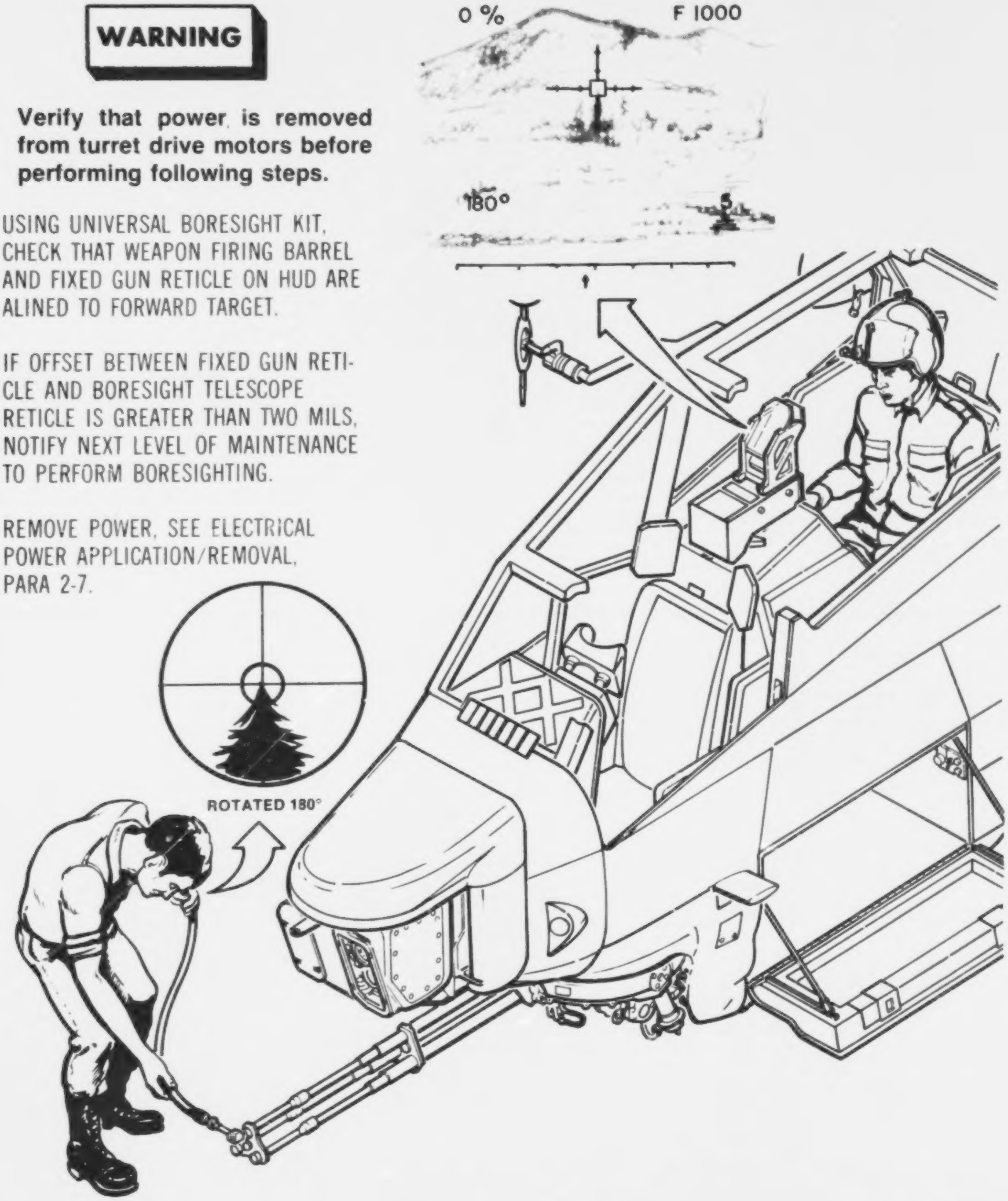
WARNING

Verify that power is removed from turret drive motors before performing following steps.

39. USING UNIVERSAL BORESIGHT KIT, CHECK THAT WEAPON FIRING BARREL AND FIXED GUN RETICLE ON HUD ARE ALINED TO FORWARD TARGET.

40. IF OFFSET BETWEEN FIXED GUN RETICLE AND BORESIGHT TELESCOPE RETICLE IS GREATER THAN TWO MILS, NOTIFY NEXT LEVEL OF MAINTENANCE TO PERFORM BORESIGHTING.

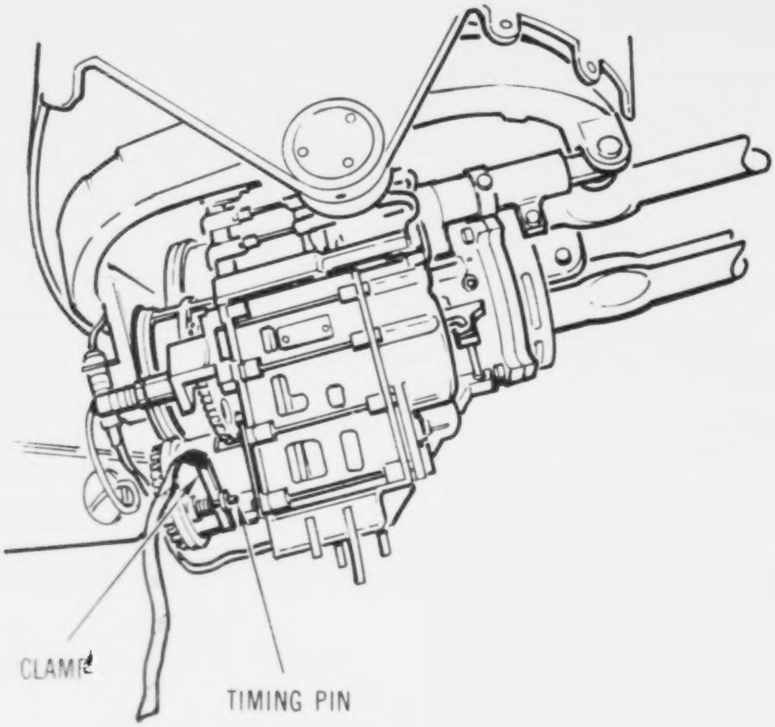
41. REMOVE POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.



ARR82-28047

QUICK CHECK BORESIGHT (cont)

42. ON M89E1 FEEDER, REMOVE CLAMP FROM TIMING PIN.


CLAMP
TIMING PIN

ARR82 28048

END OF TASK

2-10. ROCKET LAUNCHER ALINEMENT

DESCRIPTION

This task covers: Inboard seven-tube and 19-tube rocket launcher alinement.

INITIAL SETUP

Tools/Test and Support Equipment:
Tool Set, A/C Armament
Repairman: Basic
Tool Set, A/C Armament
Repairman: Supplemental
Gunner Quadrant

Personnel Required: (2)
68J Aircraft Fire Control Repairer/
68M Aircraft Weapon Systems Repairer

References:
TM 9-1055-460-13&P
TM 55-1520-236-23

Equipment Conditions:
HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP performed, para 2-6.
Inboard ejector racks installed and alined, see TM 55-1520-236-23
Rocket launchers installed on inboard ejector racks, see TM 9-1055-460-13&P.
TSU Boresight Device installed on TSU reference pads.

NOTE

Throughout this task seven-tube launcher is shown, 19-tube launcher is alined in a similar manner.

INBOARD SEVEN-TUBE AND 19-TUBE ROCKET LAUNCHER ALINEMENT

NOTE

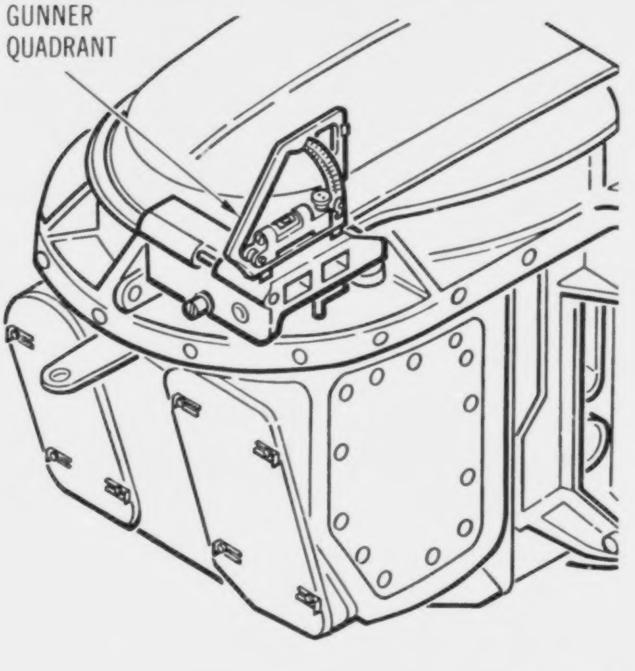
During alinement procedure using gunner quadrant, helicopter must remain level. Technicians will take their positions prior to alinement and will remain at their positions until alinement of the particular launcher is complete.

1. PLACE GUNNER QUADRANT ON TSU BORESIGHT DEVICE.

   Position quadrant so level bubble will sense pitch.

2. ADJUST QUADRANT SCALE TO CENTER LEVEL BUBBLE AND RECORD SCALE READING.

3. ADD 71.1 MILS TO READING RECORDED IN PREVIOUS STEP.



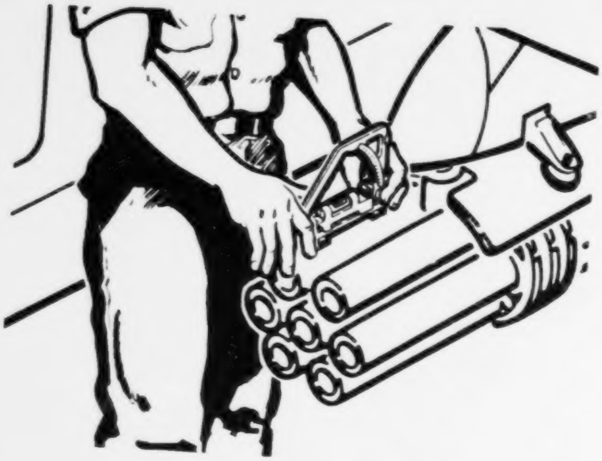
ARR82-28143

INBOARD SEVEN-TUBE AND 19-TUBE ROCKET LAUNCHER ALINEMENT (cont)

4. PLACE GUNNER QUADRANT ON ROCKET LAUNCHER TO SENSE PITCH.

5. ADJUST QUADRANT SCALE TO CENTER LEVEL BUBBLE.

   If scale reads within ± 8.9 mils of the reading recorded in step 3, pitch alinement is okay, go to step 10. If reading is not within tolerance, go to next step.



ARR82 28144

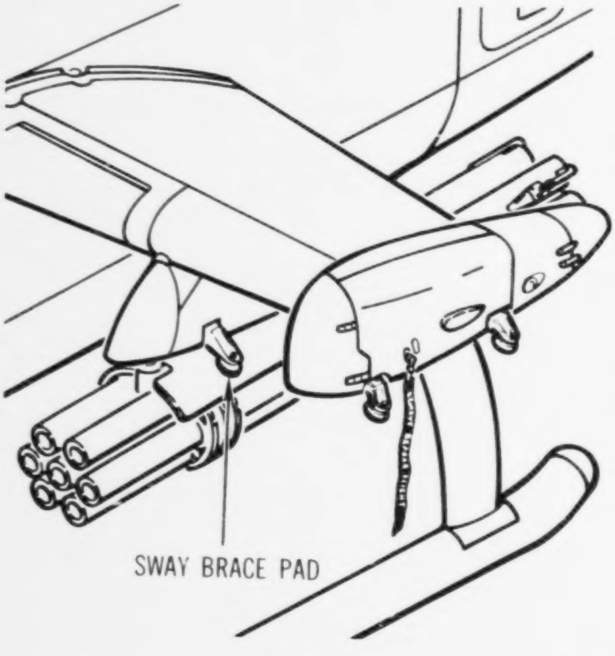
CAUTION

Remove quadrant when removing and installing rocket launcher.

NOTE

Launcher must be removed to make pitch adjustment.

6. LOOSEN SWAY BRACE PADS AND REMOVE LAUNCHER, SEE TM 9-1055-460-13&P.



ARR82 28145

2-10. ROCKET LAUNCHER ALINEMENT (cont)

INBOARD SEVEN-TUBE AND 19-TUBE ROCKET LAUNCHER ALINEMENT (cont)

CAUTION

Do not loosen suspension lug more than one full turn from setting established at installation of lugs. See TM 9-1055-460-13&P.

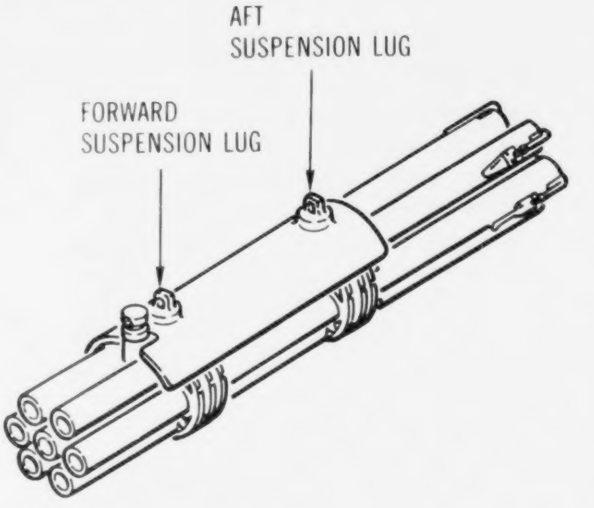
NOTE

- **One half turn of suspension lug equals approximately 3 mr elevation of the launcher.**
- M260 and M261 launcher suspension lugs are not adjustable. Recheck ejector rack alinement. See TM 55-1520-236-23.

7. ADJUST FORWARD AND/OR AFT SUSPENSION LUGS IN OR OUT.

8. INSTALL ROCKET LAUNCHER. SEE TM 9-1055-460-13&P AND REPEAT PITCH ALINEMENT AS NECESSARY.

9. CHECK QUADRANT READINGS.



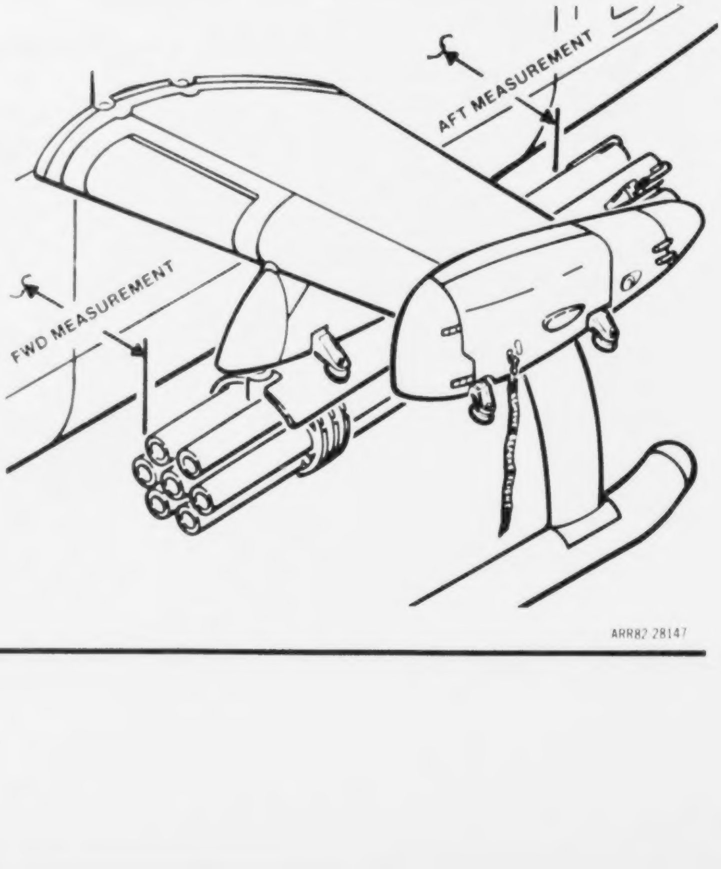
ARR82 28146

NOTE

Yaw alinement is okay when launchers are parallel to helicopter.

10. MAKE TWO MEASUREMENTS PERPENDICULAR TO HELICOPTER AND LAUNCHER AT POINTS FORWARD AND AFT. MEASUREMENTS SHOULD BE TAKEN FROM THE SAME RELATIVE POSITIONS ON THE HELICOPTER AND LAUNCHER FOR FORWARD AND AFT POINTS.

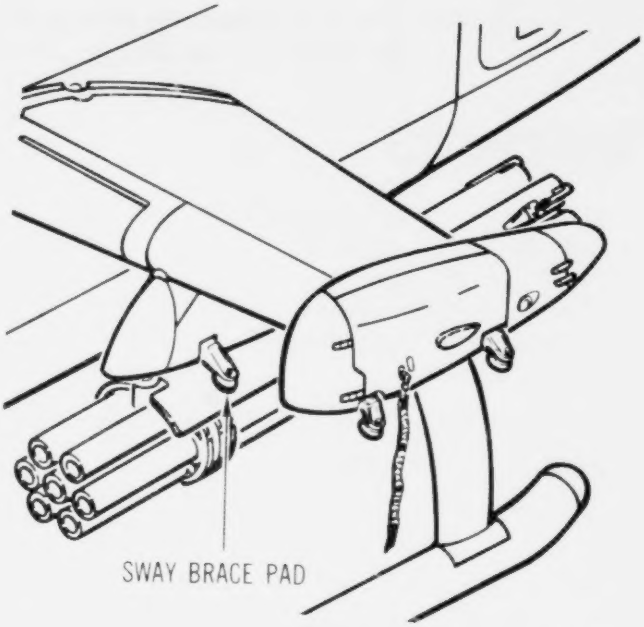
11. RECORD FORWARD AND AFT MEASUREMENTS.



ARR82 28147

INBOARD SEVEN-TUBE AND 19-TUBE ROCKET LAUNCHER ALINEMENT (cont)

12. COMPARE FORWARD AND AFT MEASUREMENTS.
    a. If measurements indicate launcher is parallel to helicopter, go to next step.
    b. If measurements indicate launcher is not parallel to helicopter, loosen sway brace pads and adjust as necessary to make launcher parallel to helicopter.



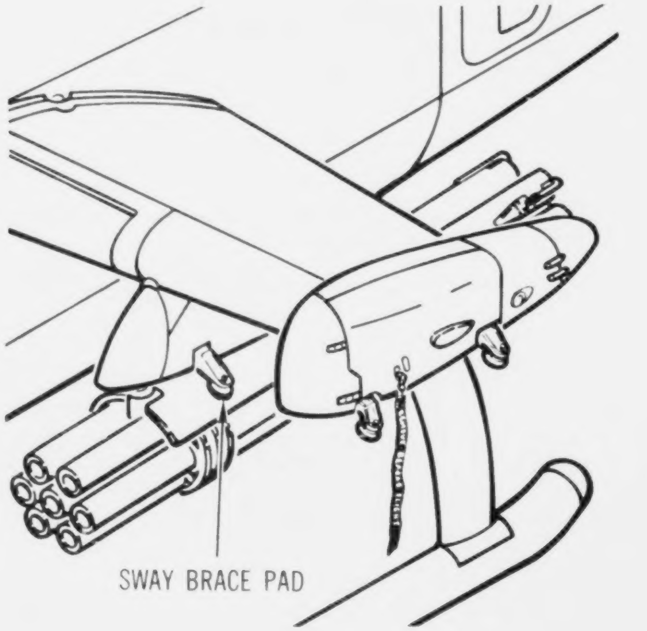
ARR82-28148

NOTE

Maintain pitch and yaw alinements while tightening sway brace pads.

13. IF NECESSARY, TIGHTEN SWAY BRACE PADS AND TORQUE TO 60 LB-IN (6.78 N.m).

14. REPEAT TASK FOR LEFT-SIDE ROCKET LAUNCHER.



ARR82-28149

END OF TASK

2-11. LOADING AMMUNITION

DESCRIPTION

This task covers: Linking and delinking ammunition, joining lengths of linked ammunition, and loading procedures for full and partial complements of ammunition.

INITIAL SETUP

Tools/Test and Support Equipment:
- Tool Set, A/C Armament Repairman: Basic
- Tool Set, A/C Armament Repairman: Supplemental
- M25 Linker-Delinker

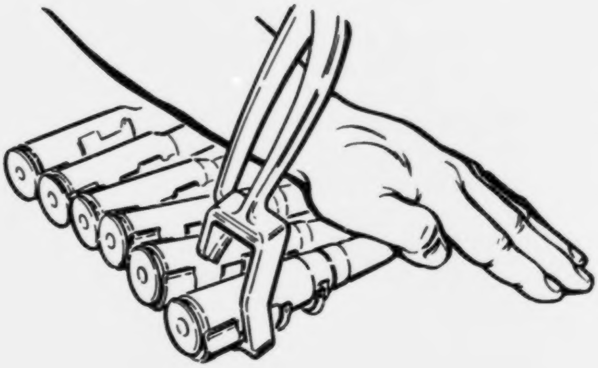
Personnel Required:
- 68M Weapon Systems Repairer (2)

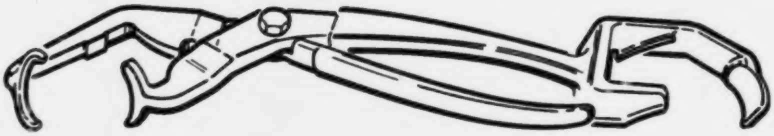
Equipment Conditions:
- HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP performed, para 2-6.
- Turret subsystem cable, W2P1, disconnected from W3J1.

General Safety Instructions:
- Observe all precautions governing care and handling of live ammunition.

DELINKING AMMUNITION

1. INSERT TIP OF DELINKER BETWEEN ROUND AND LINK ON DOUBLE LOOP END OF LINK.





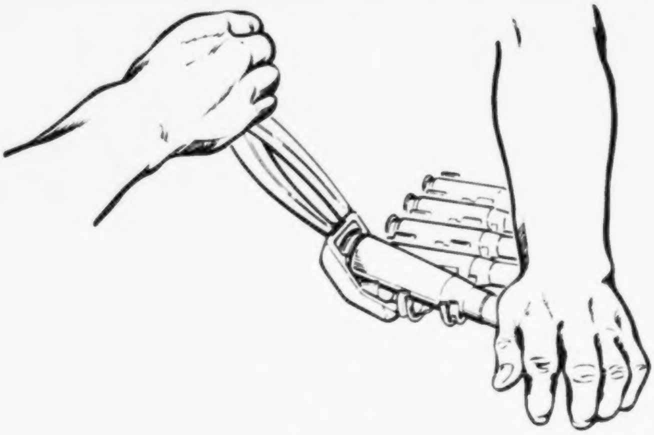
M25 LINKER-DELINKER

ARR82-26744

2-11. LOADING AMMUNITION (cont)

DELINKING AMMUNITION (cont)

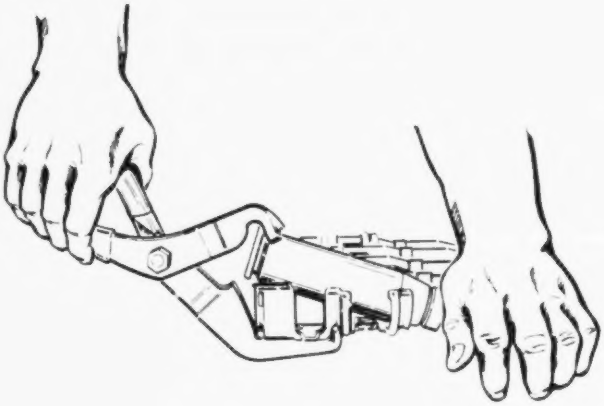
2. PULL DELINKER DOWN TO RELEASE ROUND.



ARR82-26745

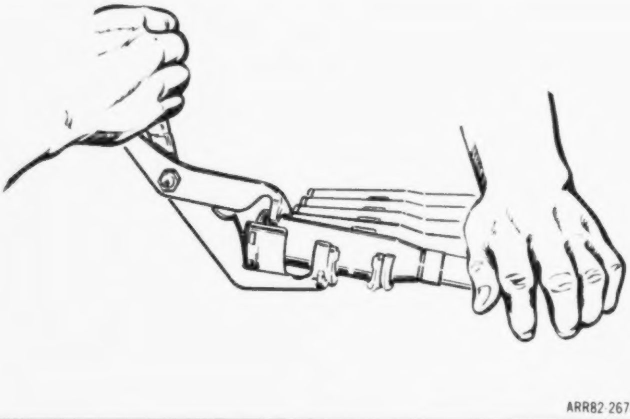
LINKING AMMUNITION

3. INSERT ROUND INTO LINK AND POSITION LINKER ON ROUND AND LINK.



ARR82-26746

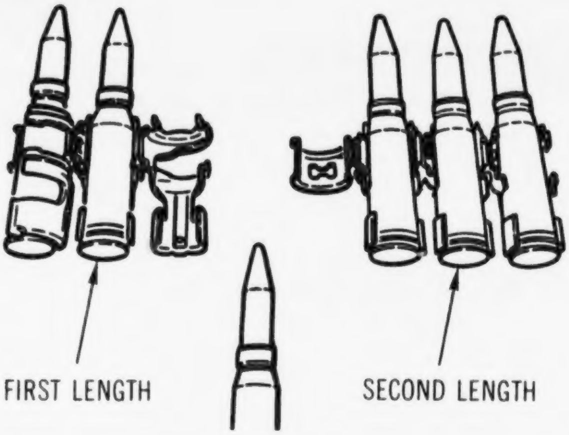
4. SQUEEZE HANDLES OF LINKER TOGETHER AND CLAMP ROUND INTO LINK.



ARR82-26747

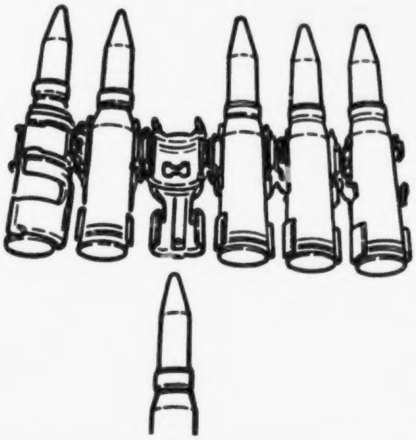
JOINING LENGTHS OF LINKED AMMUNITION

5. USING M25 LINKER-DELINKER, REMOVE LAST ROUND OF FIRST LENGTH OF LINKED AMMUNITION.



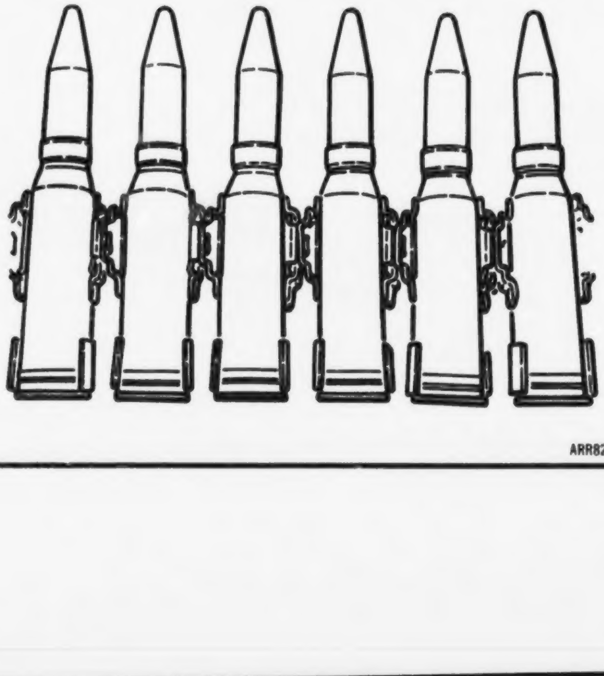
ARR82-26749

6. JOIN LEAD LINK OF SECOND LENGTH TO TRAILING LINK OF FIRST LENGTH.



ARR82-26748

7. USING M25 LINKER-DELINKER, CLAMP ROUND IN EMPTY LINK BETWEEN FIRST AND SECOND LENGTHS.



ARR82-26750

LOADING A PARTIAL COMPLEMENT OF AMMUNITION

CAUTION

At no time will rounds be loaded in either the second or third bay without making certain that the rounds loop down and up the crossover area as shown in step 29. A jam could result if this condition is not verified.

8. LOADING 685 TO 750-ROUND COMPLEMENT.

   Follow loading procedures for full complement.

9. LOADING 600 TO 684-ROUND COMPLEMENT.

   Follow loading procedures for full complement, except load first and second bays up to but not including top two rows and load third bay as required.

NOTE

There is no advantage in leaving more than top two rows of any bay empty.

10. LOADING 599 ROUNDS OR LESS.

    Follow loading procedures for full complement except leave top two rows from each bay empty until desired number of rounds are loaded.

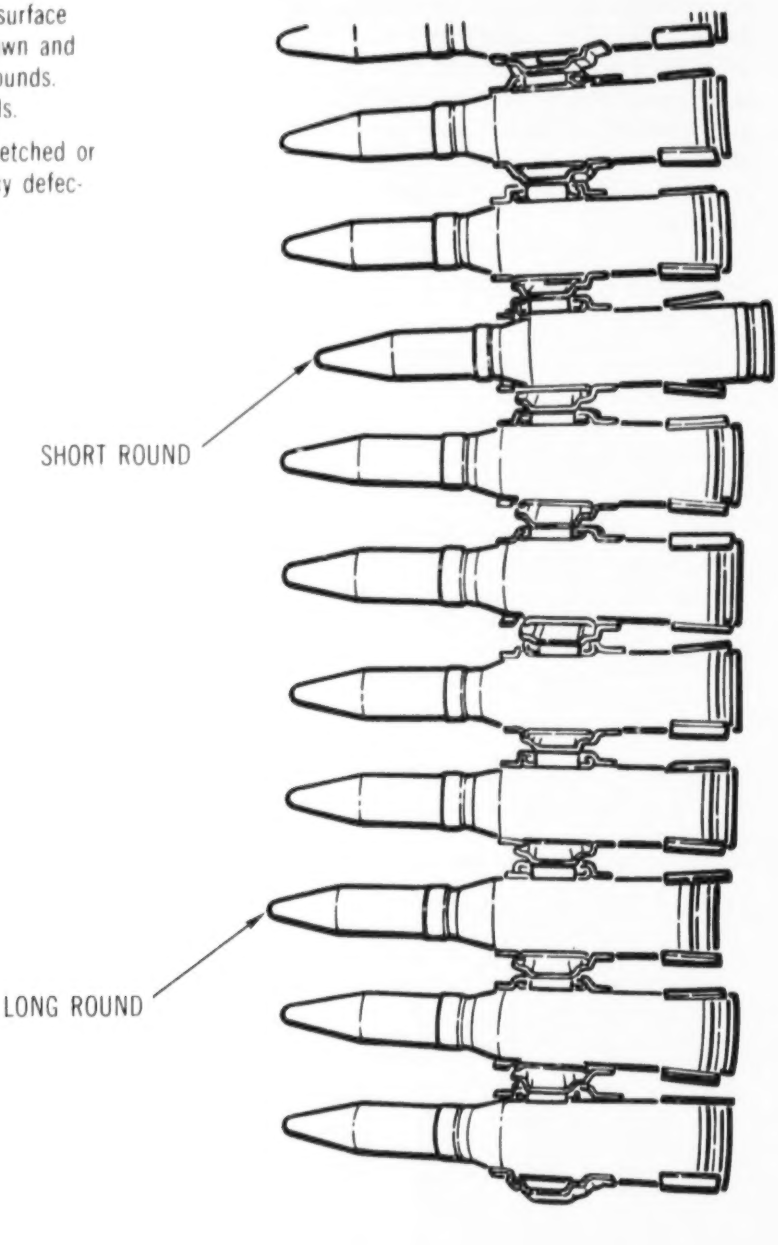
2-11. LOADING AMMUNITION (cont)

LOADING A FULL COMPLEMENT OF AMMUNITION

11. INSPECT EACH BOX OF LINKED AMMUNITION FOR MISLINKED ROUNDS AND DEFECTIVE LINKS.

    a. Lay ammunition on a flat surface with closed side of link down and inspect for long or short rounds. Relink any mislinked rounds.

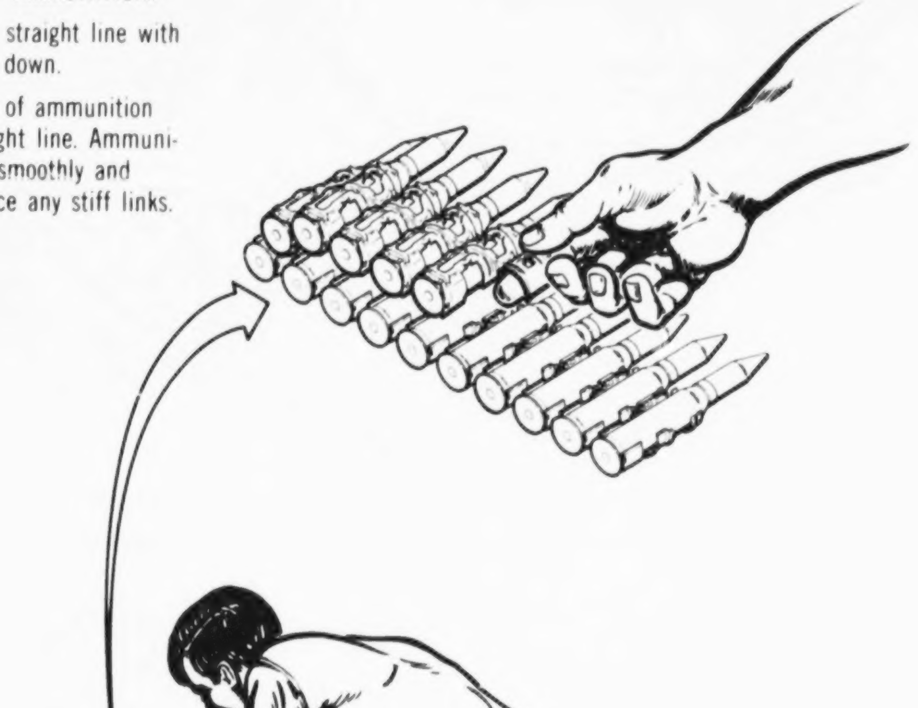
    b. Inspect ammunition for stretched or deformed links. Replace any defective links.



ARR82-26751

LOADING A FULL COMPLEMENT OF AMMUNITION (cont)

12. PERFORM FREE HINGING TEST ON EACH BOX OF LINKED AMMUNITION.
    a. Lay ammunition in straight line with closed side of link down.
    b. Fold over lead end of ammunition and pull in a straight line. Ammunition will fold over smoothly and hinge freely. Replace any stiff links.
    c. Repeat step b.



ARR82-26752

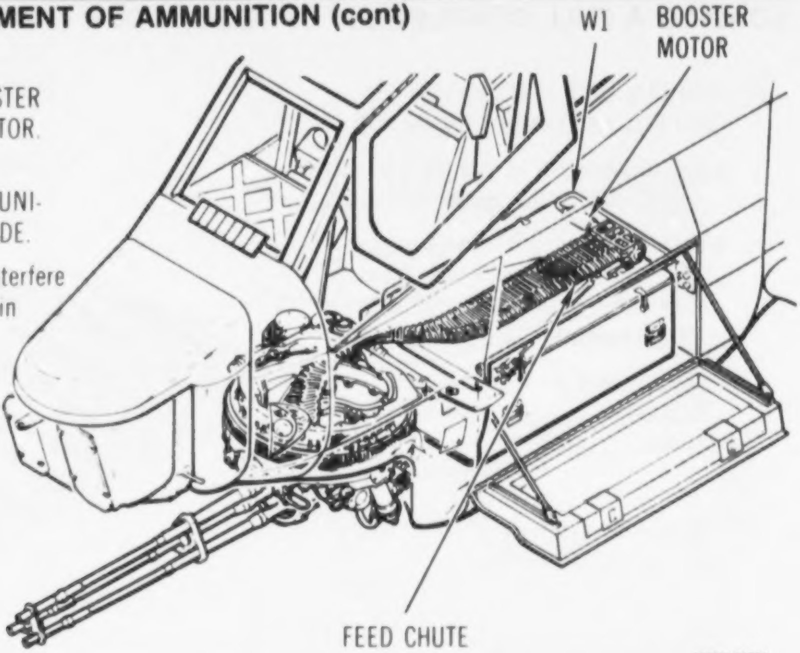
2-11. LOADING AMMUNITION (cont)

LOADING A FULL COMPLEMENT OF AMMUNITION (cont)

13. REMOVE CABLE W1 FROM BOOSTER MOTOR AND AIRCRAFT CONNECTOR.

14. REMOVE TWO PINS FROM AMMUNITION BAY TRACKS ON RIGHT SIDE.

    Place pins so they will not interfere with ammunition box sliding in tracks.



ARR82-26753

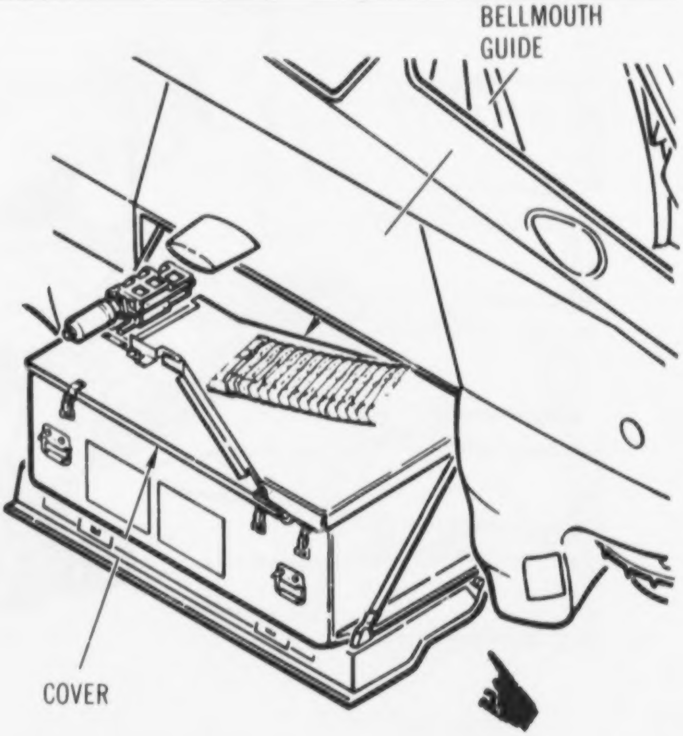
15. PLACE AMMUNITION BOX ON RIGHT-HAND AMMUNITION BAY DOOR.

    Position ammunition box on tracks provided for sliding ammunition box in and out of compartment.

16. REMOVE FEED CHUTE FROM BOOSTER.

17. REMOVE BELLMOUTH GUIDE AND COVER.

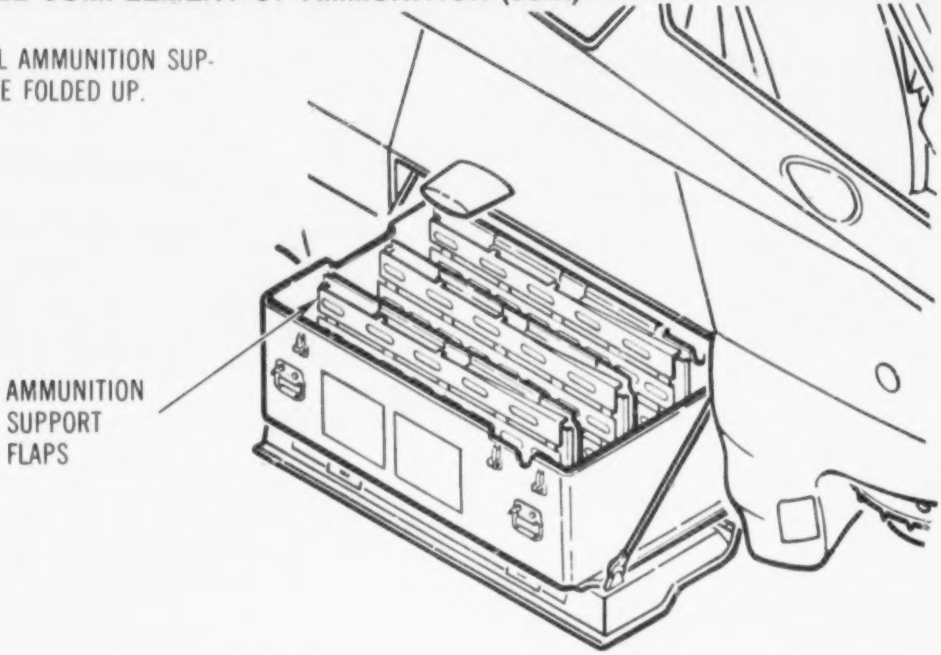
    Release fasteners on both sides.



ARR82-26754

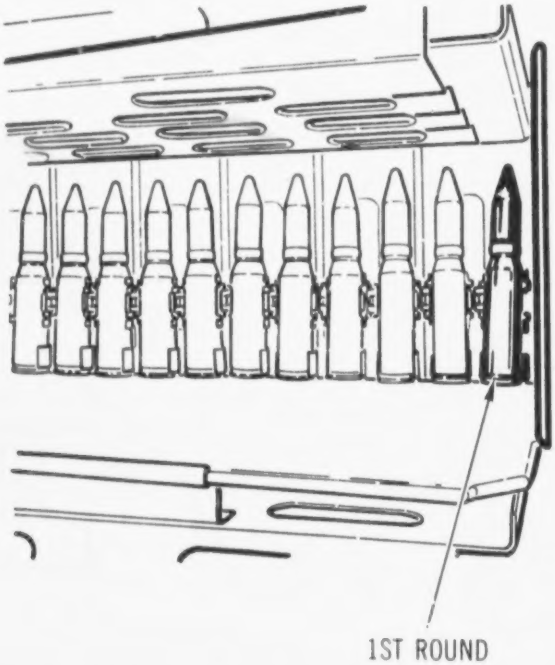
LOADING A FULL COMPLEMENT OF AMMUNITION (cont)

18. CHECK THAT ALL AMMUNITION SUPPORT FLAPS ARE FOLDED UP.


AMMUNITION SUPPORT FLAPS

ARR82 26755

19. PLACE FIRST LINKED ROUND, LINK DOWN IN BAY ONE, AGAINST CROSSOVER BULKHEAD OF AMMUNITION BOX.

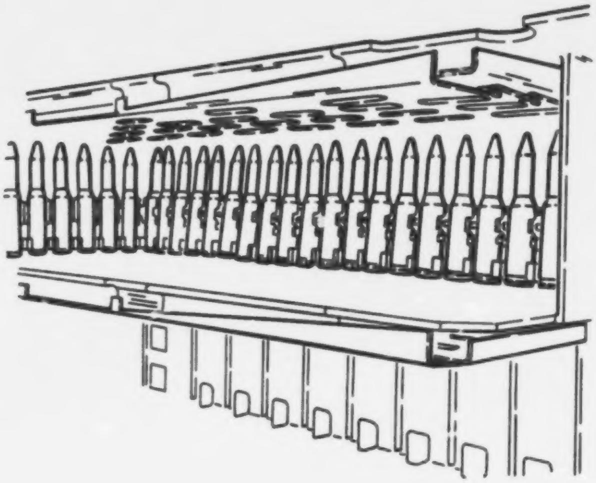


ARR82-26756

2-11. LOADING AMMUNITION (cont)

LOADING A FULL COMPLEMENT OF AMMUNITION (cont)

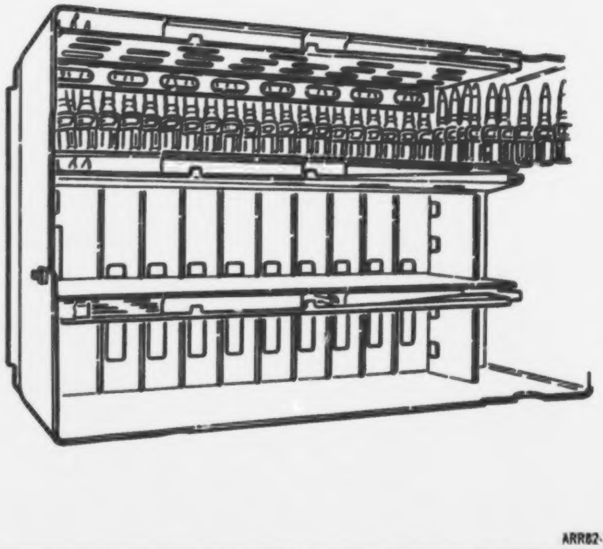
20. PLACE 21 ROUNDS FROM CROSSOVER BULKHEAD TO REAR PANEL OF AMMUNITION BOX. ROUNDS SHOULD LIE FLAT AND EVEN.



ARR82-26757

21. FOLD LINKED AMMUNITION AND PLACE 21 ROUNDS FROM REAR PANEL TO CROSSOVER BULKHEAD. ROUNDS SHOULD LIE FLAT AND EVEN.

22. FOLD AMMUNITION SUPPORT FLAP DOWN ON PROJECTILE END OF AMMUNITION.



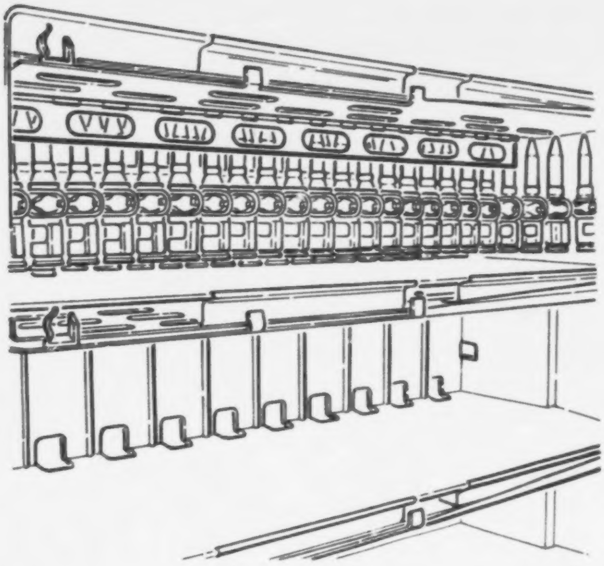
ARR82-26758

LOADING A FULL COMPLEMENT OF AMMUNITION (cont)

23. FOLD AMMUNITION AND PLACE 21 ROUNDS FROM CROSSOVER BULKHEAD TO REAR PANEL OF AMMUNITION BOX. FOLD AMMUNITION AND PLACE 21 ROUNDS FROM REAR PANEL OF AMMUNITION BOX TO CROSSOVER BULKHEAD. ROUNDS SHOULD LIE FLAT AND EVEN.

24. FOLD AMMUNITION SUPPORT FLAP DOWN ON PROJECTILE END OF AMMUNITION.

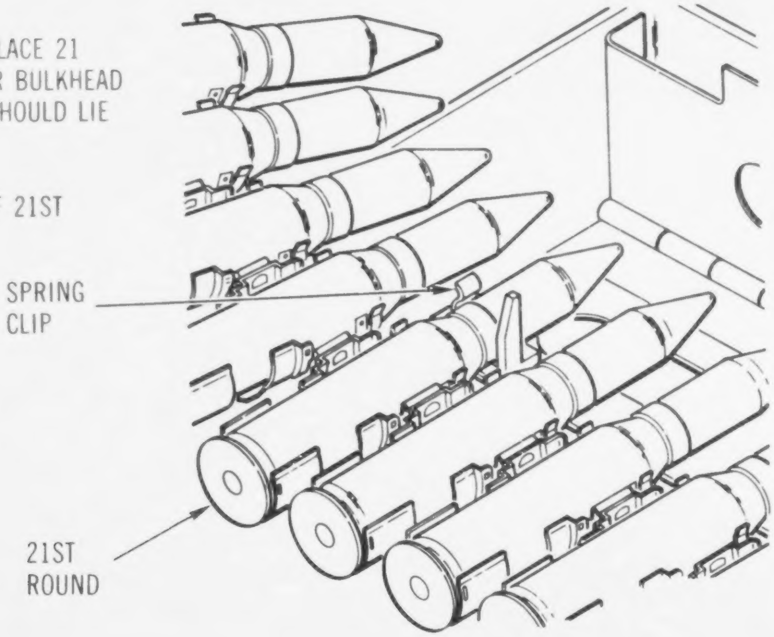
25. REPEAT STEPS 23 AND 24 UNTIL TOP AMMUNITION SUPPORT FLAP IS FOLDED DOWN.



ARR82-26759

26. FOLD AMMUNITION AND PLACE 21 ROUNDS FROM CROSSOVER BULKHEAD TO REAR PANEL. ROUND SHOULD LIE FLAT AND EVEN.

27. PLACE PROJECTILE END OF 21ST ROUND IN SPRING CLIP.



ARR82-26760

2-11. LOADING AMMUNITION (cont)

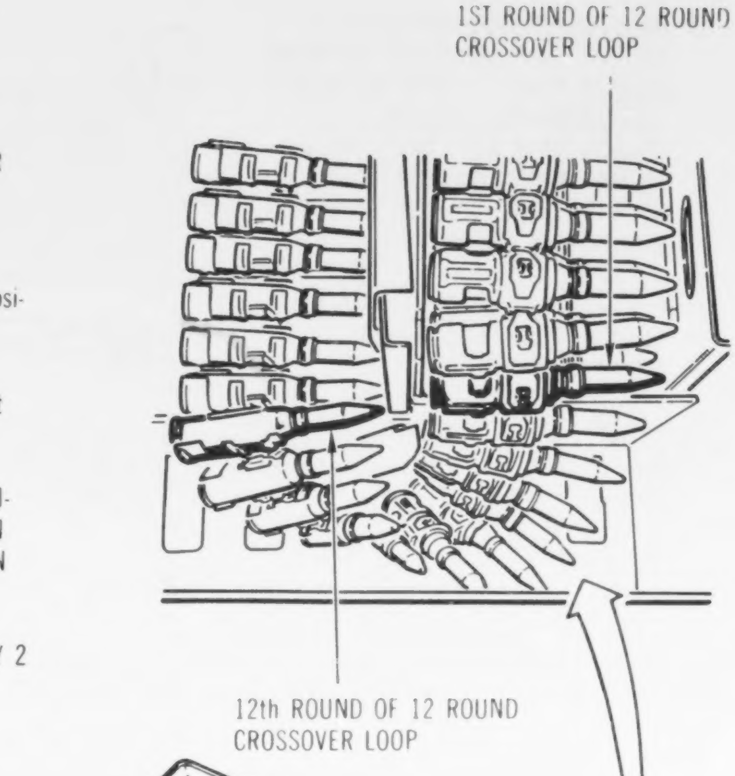
LOADING A FULL COMPLEMENT OF AMMUNITION (cont)

28. FOLD AMMUNITION AND PLACE 21 ROUNDS FROM REAR PANEL TO CROSSOVER BULKHEAD. ROUNDS SHOULD LIE FLAT AND EVEN.

29. LOOP 12 ROUNDS OVER CROSSOVER BULKHEAD.
    a. Carefully position first round of crossover loop and make certain 12th round of crossover loop is positioned on crossover bulkhead.
    b. Allow ammunition to hang from crossover bulkhead to floor of next bay.

30. SLIDE BOX PARTIALLY INTO AMMUNITION BAY TO PREVENT AMMUNITION BOX FROM FALLING OFF DOOR WHEN SUCCEEDING BAYS ARE LOADED.

31. REPEAT STEPS 20 THRU 29 FOR BAY 2 AND 3 UNTIL AMMUNITION BOX IS LOADED.

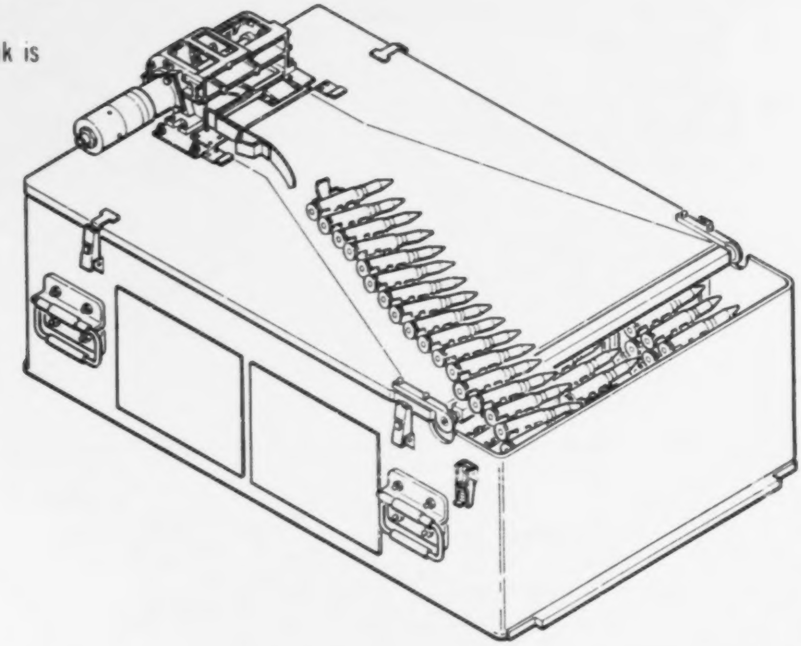

1ST ROUND OF 12 ROUND CROSSOVER LOOP
12th ROUND OF 12 ROUND CROSSOVER LOOP
ARR82 26761

LOADING A FULL COMPLEMENT OF AMMUNITION (cont)

32. PLACE COVER ON AMMUNITION BOX AND SECURE WITH FASTENERS.

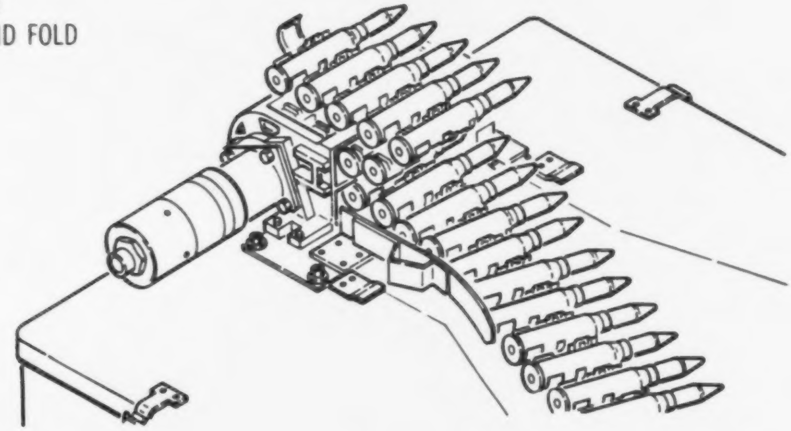
33. LAY LINKED AMMUNITION FROM LAST BAY LOADED ON BOX COVER.

    Check that closed side of link is down on box cover.



ARR82-26762

34. HAND FEED APPROXIMATELY 20 ROUNDS THROUGH BOOSTER AND FOLD BACK OVER BOOSTER.



ARR82-26763

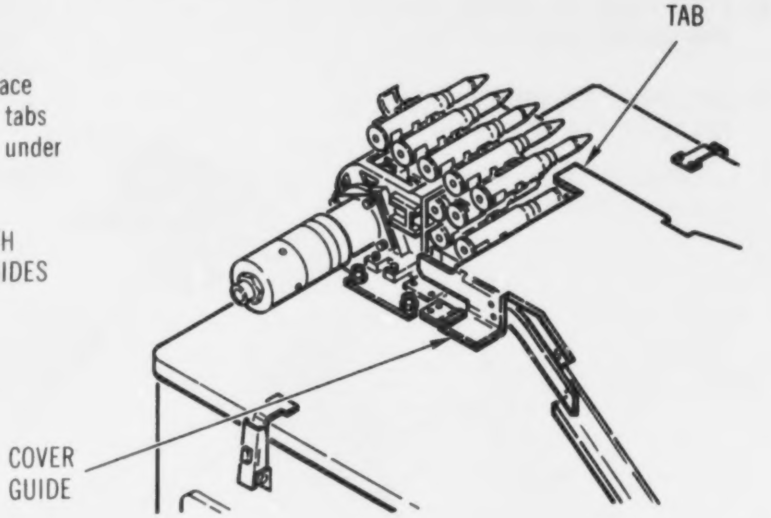
2-11. LOADING AMMUNITION (cont)

LOADING A FULL COMPLEMENT OF AMMUNITION (cont)

35. INSTALL BELLMOUTH GUIDE.

    Slide bellmouth guide into place making sure bellmouth guide tabs are inserted into booster and under cover guides.

36. SECURE BELLMOUTH GUIDE WITH FASTENERS PROVIDED ALONG SIDES OF AMMUNITION BOX.



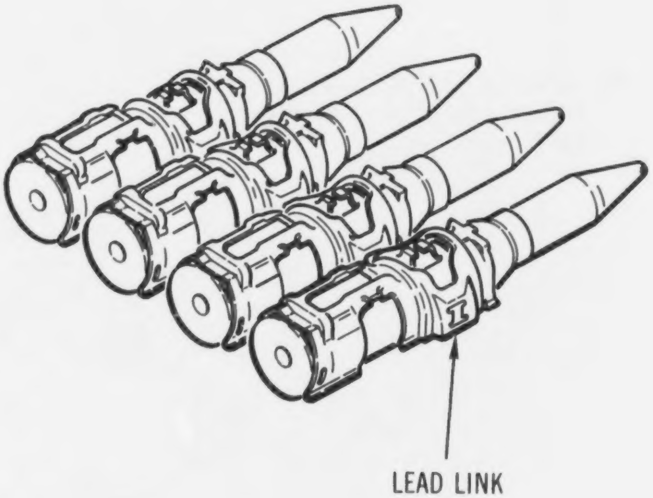
ARR82-26764

NOTE

To obtain a fully loaded system, a length of ammunition may be hand fed through feed chute to the M89E1 feeder. In this case, prepare the lead link of this length and join the trailing link to the ammunition at the booster.

37. PREPARE THE LEAD LINK OF AMMUNITION.

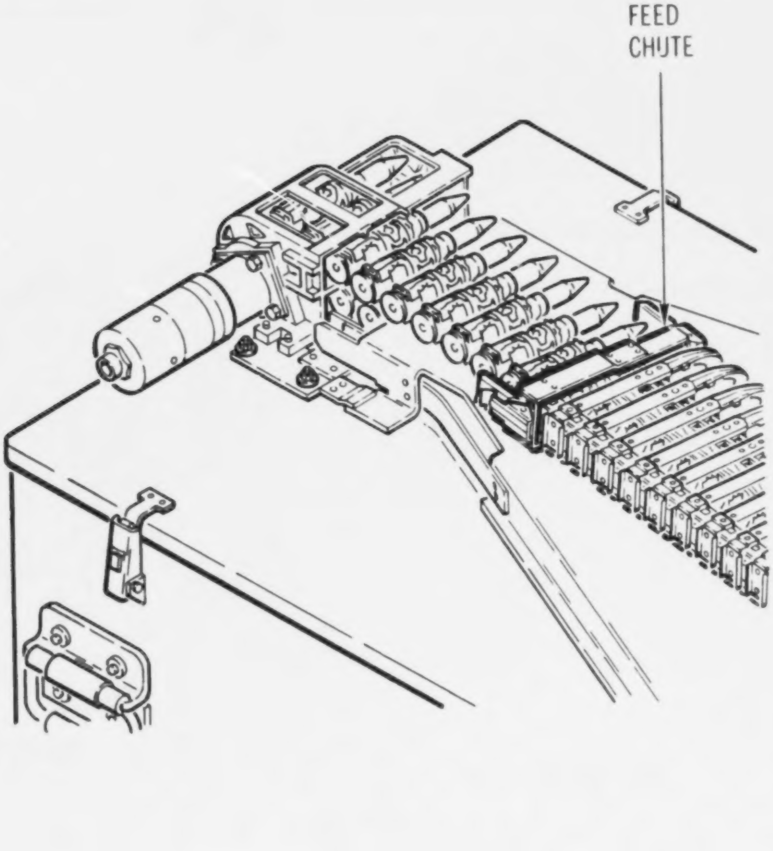
    Remove the single loop from the lead link of ammunition.



ARR82-26765

LOADING A FULL COMPLEMENT OF AMMUNITION (cont)

38. PLACE FEED CHUTE ON TOP OF AMMUNITION BOX AND FEED AMMUNITION INTO FEED CHUTE WHILE SLIDING AMMUNITION BOX INTO BAY. SECURE FEED CHUTE TO BOOSTER WITH TWO CLIPS.



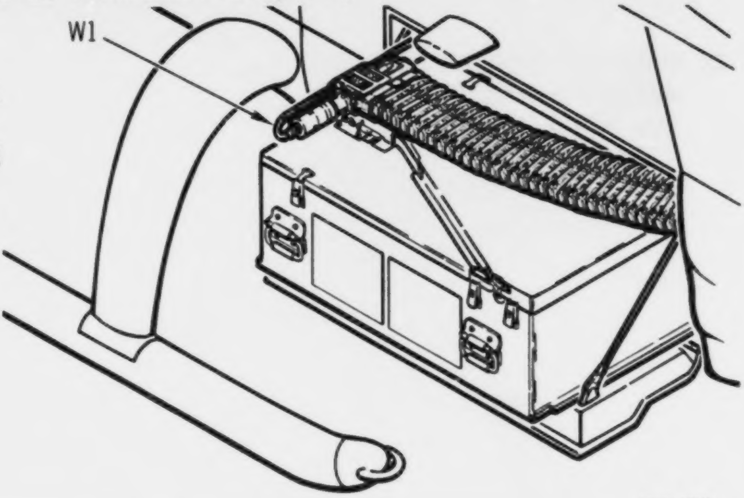
ARR82-26767

2-11. LOADING AMMUNITION (cont)

LOADING A FULL COMPLEMENT OF AMMUNITION (cont)

39. CONNECT CABLE W1, TO BOOSTER MOTOR AND AIRCRAFT CONNECTOR.

40. FINISH PUSHING AMMUNITION BOX INTO COMPARTMENT AND SECURE WITH TWO PINS. CHECK THAT TWO PINS ON OPPOSITE SIDE ARE IN PLACE.



ARR82-26768

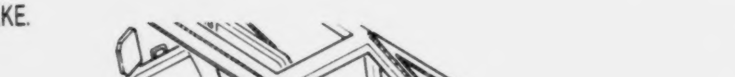
41. RELEASE ELEVATION DRIVE MOTOR BRAKE AND MANUALLY POSITION TURRET TO FIXED FORWARD POSITION.

42. APPLY ELEVATION DRIVE MOTOR BRAKE.

43. APPLY POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.

44. USING AMMO LOAD SWITCH, JOG AMMUNITION UNTIL LEAD LINK IS AT M89E1 FEEDER.

45. REMOVE POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.

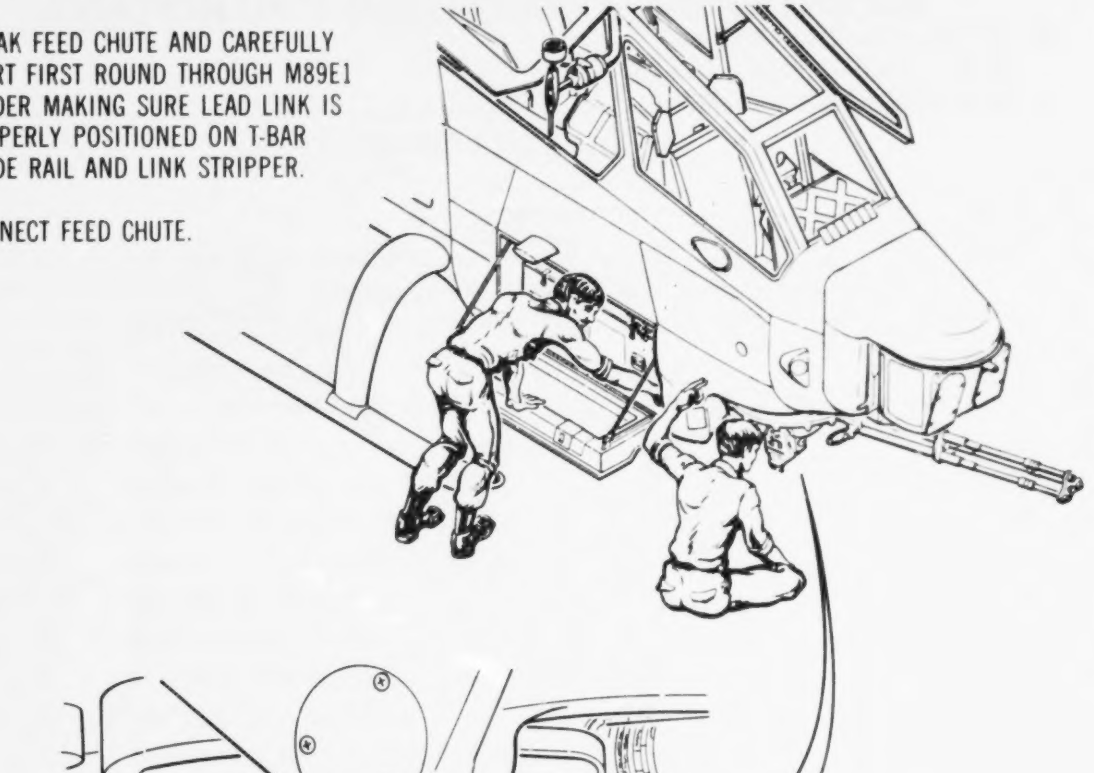


ARR82-26769

LOADING A FULL COMPLEMENT OF AMMUNITION (cont)

46. BREAK FEED CHUTE AND CAREFULLY START FIRST ROUND THROUGH M89E1 FEEDER MAKING SURE LEAD LINK IS PROPERLY POSITIONED ON T-BAR GUIDE RAIL AND LINK STRIPPER.

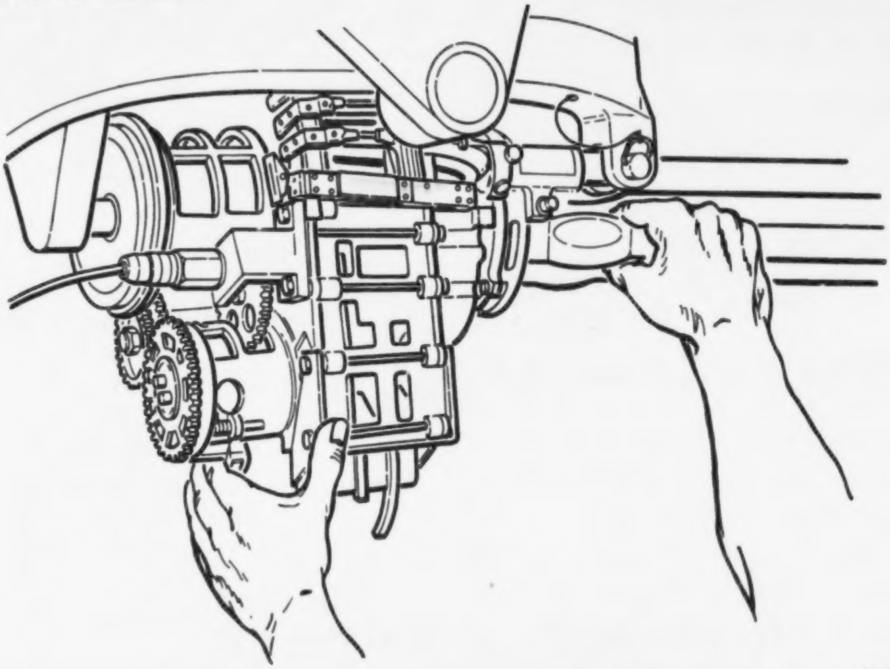
47. CONNECT FEED CHUTE.


1ST ROUND
LINK STRIPPER
T-BAR GUIDE RAIL
ARRB2 26770 A

2-11. LOADING AMMUNITION (cont)

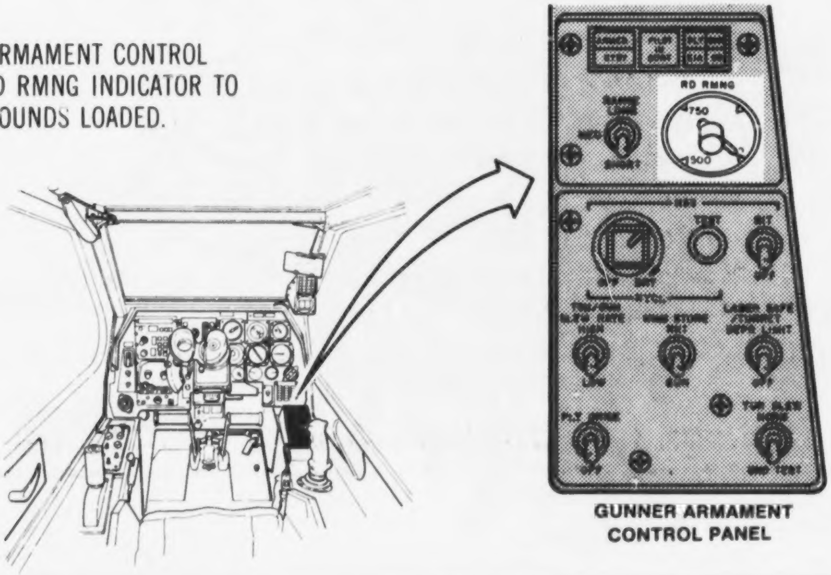
LOADING A FULL COMPLEMENT OF AMMUNITION (cont)

48. DEPRESS FEEDER SOLENOID AND MANUALLY ROTATE BARREL CLUSTER UNTIL FIRST ROUND IS DELINKED.



ARR82-26771

49. ON GUNNER ARMAMENT CONTROL PANEL, SET RD RMNG INDICATOR TO NUMBER OF ROUNDS LOADED.


RD RMNG
750
500
TEST
GUNNER ARMAMENT CONTROL PANEL

ARR82-26772

END OF TASK

CHAPTER 3

AVIATION UNIT MAINTENANCE INSTRUCTIONS

CHAPTER CONTENTS

		Page
Section I	Lubrication Instructions	3-1
Section II	Repair Parts, Special Tools; Test, Measurement, and Diagnostic Equipment (TMDE); and Support Equipment	3-2
Section III	Preventive Maintenance Checks and Services	3-2
Section IV	General Maintenance Instructions	3-14
Section V	System Testing and Troubleshooting	3-23
Section VI	Line Replaceable Unit Checks	3-128
Section VII	Maintenance of M89E1 Feeder	3-169
Section VIII	Maintenance of M197 Gun	3-209
Section IX	Maintenance of Gun Drive	3-293
Section X	Maintenance of Recoil Adapter and Slider	3-297
Section XI	Maintenance of Turret	3-301
Section XII	Maintenance of Ammunition Feed System	3-335
Section XIII	Maintenance of Emergency Stow Control Unit	3-371
Section XIV	Maintenance of Logic Control Unit	3-377
Section XV	Maintenance of Gun Control Unit	3-381
Section XVI	Maintenance of Turret Control Unit	3-385
Section XVII	Maintenance of Gunner Armament Control Panel	3-391
Section XVIII	Maintenance of Pilot Armament Control Panel	3-395
Section XIX	Maintenance of Interface Control Unit	3-399
Section XX	Maintenance of Turret Buffer Amplifier	3-403
Section XXI	Maintenance of Logic Relay Assembly	3-407
Section XXII	Maintenance of Acquisition Switch Panel and Switch	3-413
Section XXIII	Maintenance of Airspeed Transducer	3-419

Section I. LUBRICATION INSTRUCTIONS

Section Contents	Para
General	3-0

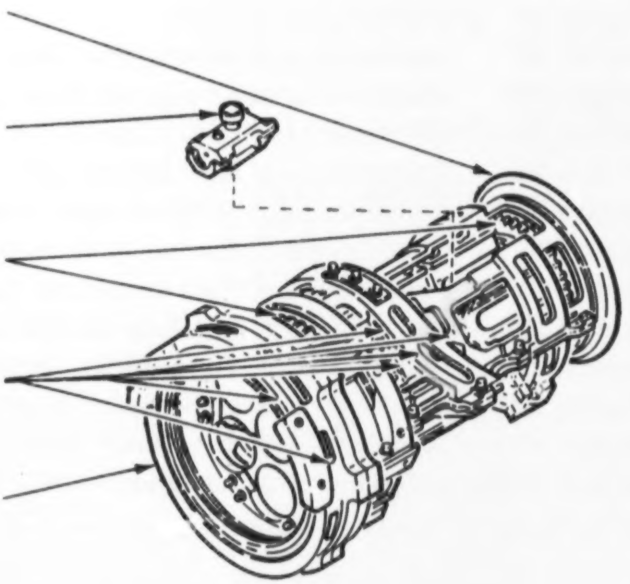
3-0. GENERAL

The lube instructions prescribe cleaning and lube procedures, proper materials for lubing, and lube intervals. The lube location is also included. Overall views showing lube points precede the detailed notes. The lubrication instructions are mandatory.

LUBRICATION INSTRUCTIONS

Intervals and the related manhour times are based on normal operation. The manhour time specified is the time you need to do all the services prescribed for a particular interval. Change the interval if your lubricants are contaminated or if you are operating the equipment under adverse operating conditions, including longer-than-usual operating hours. You may extend the interval during periods of low activity, but you must take adequate preservation precautions. Time in MAN-HR column applies only to listed interval; add listed times if lubrication for two or more intervals is performed at same time. Level of maintenance for lubrication requirements is Aviation Unit Maintenance (AVUM). Clean fittings before lubricating. Clean parts with THINNER, PAINT, MINERAL SPIRITS (TPM) or DRY CLEANING SOLVENT (SD-2). Dry before lubricating. Dotted lines indicate lubrication points on both sides of the equipment. Do not over lubricate; wipe off excess lubricant.

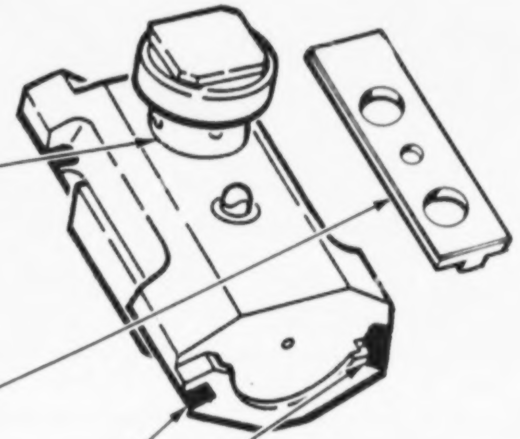
	LUBRICANT	INTERVAL
END PLATE	GIA (See note 3)	1.5*
**BREECH BOLT AND ROTOR TRACK	LAW-AW (See note 2)	1.5*
GEAR TEETH	LAW-AW (See note 4)	1.5*
LOCKING WELLS CAM PATH AND UNLOCKING CAMS	LAW-AW (See note 5)	1.5*
HOUSING	LAW-AW (See note 1)	D



**See page 3-2.1 for lubrication points.

See page 3-2.2 for notes.

20-MM AUTOMATIC GUN, M197

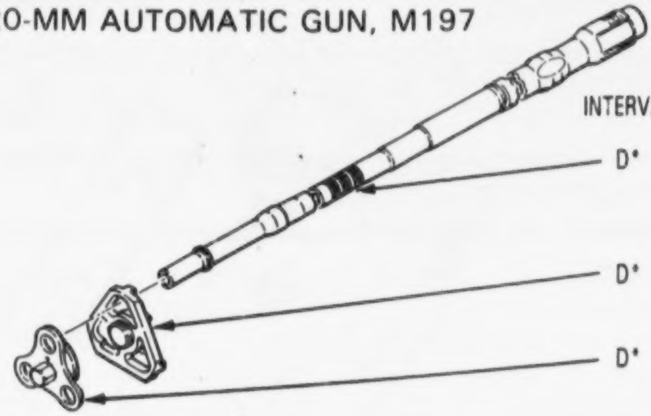


INTERVAL	LUBRICANT	
1.5	LAW-AW (See note 2)	BOLT SHAFT
1.5	LAW-AW (See note 2)	ROTOR TRACKS
1.5	LAW-AW (See note 2)	INSIDE OF BOLT SLOTS

Refer to page 3-2.2 for note.

BREECH BLOCK AND FORWARD ROTOR TRACK

20-MM AUTOMATIC GUN, M197



INTERVAL	LUBRICANT	
D*	LAW-AW SFD (See note 1)	GUN BARREL
D*	SFD (See note 1)	BARREL CLAMP
D*	SFD (See note 1)	MUZZLE CLAMP

TOTAL MAN-HR

INTERVAL	MAN-HR
*	N A
D	0.5
1.5	1.5

TOTAL MAN-HR

KEY

LUBRICANT	REFILL CAPACITY (APP)	EXPECTED TEMPERATURE Above +32°F	+40°F to 10°F	0°F to -65°F		INTERVAL
GIA - Grease, instrument, (MIL-G-23827) aircraft	As req	All temperatures			For arctic operation refer to TM9 207	W - Weekly
LAW-AW - Lubricant, all-weather (automatic weapons) (DOD-L-85336)	As req					1.5 - 1500 rounds cycled 1.5 - 1500 rounds cycled
SFD - Lubricant, solid film air cured (corrosion inhibiting) (MIL-L-46147R)						M - Monthly

NOTES

1. GUN HOUSING AND BARREL CLUSTER - Daily after firing and every 30 days during inactive periods coat inside and outside surfaces of gun housing with lubricant (LAW-AW). Daily after firing and every 30 days, coat inside and outside surfaces of gun barrels and exposed surfaces of barrel and muzzle clamps with lubricant (SFD).

2. BREECH BOLT AND ROTOR TRACK - Every 1500 rounds cycled, clean breech bolts and rotor track assemblies and lubricate with LAW-AW. See page 3-2.1 for lubrication points.

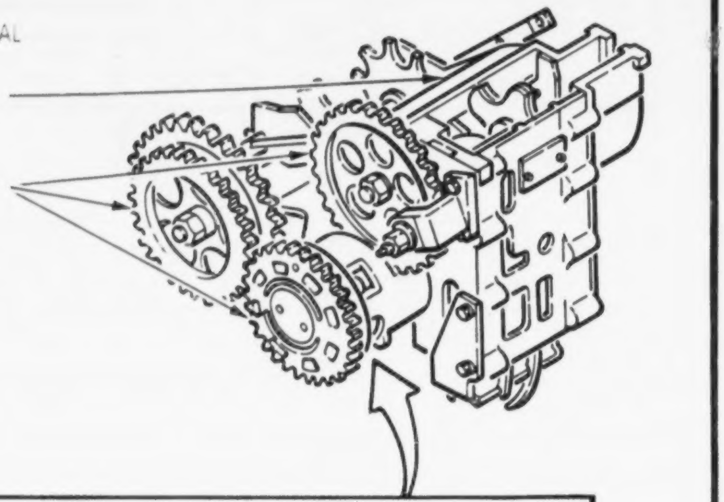
3. END PLATE - Each time M197 gun is removed/installed, lubricate ball mount and end plate socket with GIA.

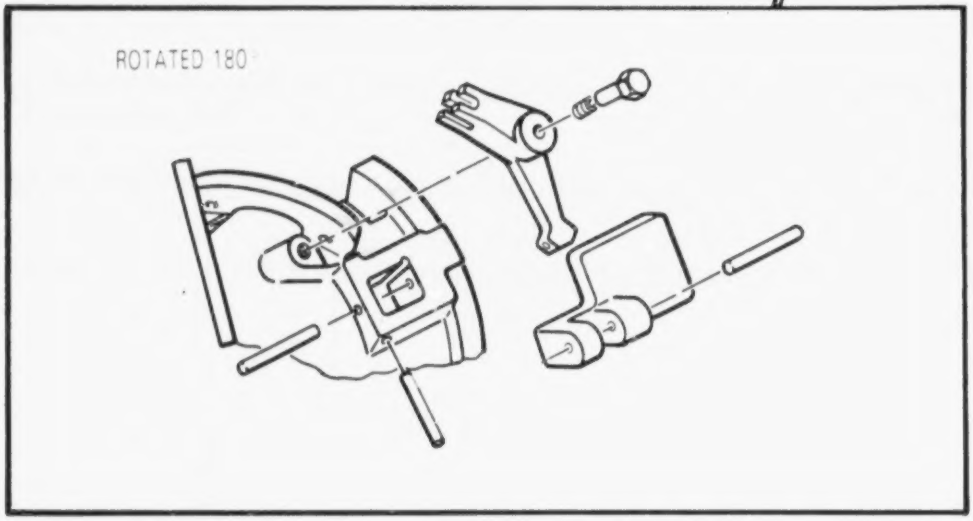
4. GEAR TEETH - Each time M197 gun is removed/installed, lubricate all gear teeth with LAW-AW.

5. REAR SURFACE FRONT LOCKING WELLS, CAM PATH, AND UNLOCKING CAMS - Each time M197 gun is removed/installed, lubricate rear surface front locking wells, cam path, and unlocking cams with LAW-AW.

	LUBRICANT	INTERVAL
HOUSING	PL-S (See note 2)	D
GEARS	LAW-AW (See note 1)	1.5
ARM AND WEDGE	LAW-AW (See note 1)	1.5

See page 3-2-4 for notes





FEEDER ASSEMBLY, M89E1

TOTAL MAN-HR		TOTAL MAN-HR
INTERVAL	MAN-HR	
	N A	
D	0.2	
1.5	0.2	

KEY

LUBRICANT	REFILL CAPACITY (APP)	EXPECTED TEMPERATURE				INTERVAL
		Above +32°F	+40°F to 10°F	0°F to -65°F		
PL-S – Lubricating oil, general purpose, preservative (VV-L-800)	As req	All temperatures			For arctic operation refer to TM9-207	* – During reassembly or installation D – Daily when equipment is operated
LAW-AW – Lubricant all-weather (automatic weapons) (DOD-L-85336)	As req					1.5 – 1500 rounds cycled

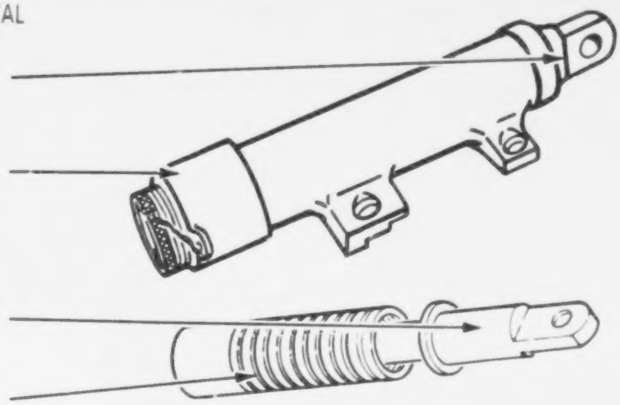
NOTES

1. FEEDER ASSEMBLY – Every 30 days or 1500 rounds cycled, lubricate arm and wedge and coat gear teeth with lubricant (LAW-AW).

2. FEEDER HOUSING – Daily after firing and every 30 days during inactive periods, coat outside surface with lubricating oil (PL-S). Wipe off excess oil.

3. Refer to TM 9-1090-206-30 for aviation intermediate maintenance lubrication points.

	LUBRICANT	INTERVAL
SPINDLE	GIA (See note 1)	Q
HOUSING	PL-S (See note 2)	1.5
SPINDLE	SFD (See note 1)	Q
GRAPHITE	(See note 1)	Q



RECOIL ADAPTER

TOTAL MAN-HR		TOTAL MAN-HR
INTERVAL	MAN-HR	
Q	0.1	
1.5	0.1	

KEY

LUBRICANT		REFILL CAPACITY (APP)	EXPECTED TEMPERATURE				INTERVAL	
			Above +32°F	+40°F to 10°F	0°F to -65°F			
GIA (MIL G 23827)	Grease instrument aircraft	As req				For arctic operation refer to TM9 207	Q	Quarterly
SFD (MIL L 46147R) air cured (corrosion inhibiting)	Lubricant solid film	As req		All temperatures			Q	Quarterly
PL-S (VV L 800)	Lubricating oil general purpose preservative	As req					1.5	1500 rounds cycled
Graphite	Grease aircraft (XP 190) ord graphite	As req					Q	Quarterly

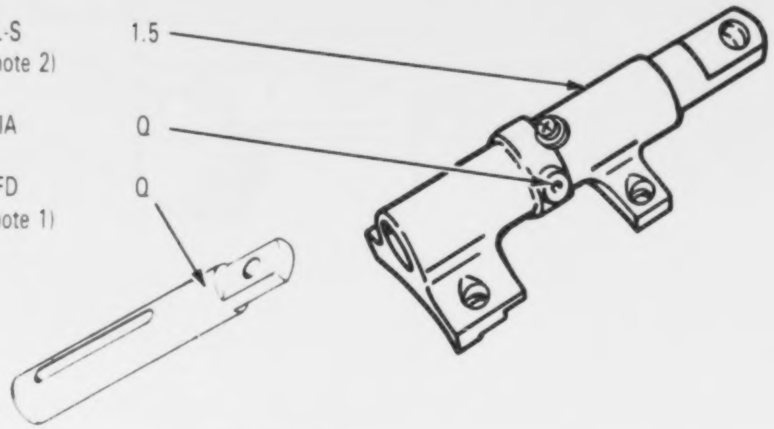
NOTES

1. SPINDLE – Every 90 days coat spindle rings with graphite. Coat any smooth shiny areas of spindle with lubricant (SFD). Apply a coat of grease (GIA) around spindle where it protrudes from recoil adapter housing.

2. HOUSING – Every 1500 rounds or 10 days, coat outside surfaces with lubricating oil (PL-S). After application, wipe off excess oil.

3. Refer to TM 9-1090-206-30 for aviation intermediate maintenance points.

	LUBRICANT	INTERVAL
HOUSING	PL-S (See note 2)	1.5
SPINDLE	GIA	Q
	SFD (See note 1)	Q



SLIDER

TOTAL MAN-HR		TOTAL MAN-HR
INTERVAL	MAN-HR	
1.5	0.1	
Q	0.1	

KEY

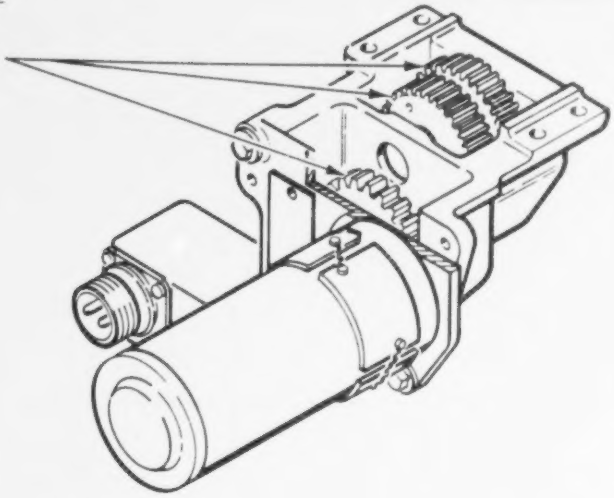
LUBRICANT	REFILL CAPACITY (APP)	EXPECTED TEMPERATURE Above +32°F	+40°F to 10°F	0°F to -65°F		INTERVAL
GIA - Grease, instrument, aircraft (MIL-G-23827)	As req	All temperatures			For arctic operation refer to TM9 207	Q - Quarterly
PL-S - Lubricating oil, general purpose, preservative (VV-L-800)	As req					1.5 - 1500 rounds cycled
SFD - Lubricant, solid film, air cured (corrosion inhibiting) (MIL-L-46147R)	As req					Q - Quarterly

NOTES

1. SPINDLE – Every 90 days, lubricate fitting with GIA. Coat any smooth shiny areas of spindle with lubricant (SFD).

2. HOUSING – Every 1500 rounds or 10 days coat outside surfaces with lubricating oil (PL-S). After application, wipe off excess oil.

	LUBRICANT	INTERVAL
GEAR TEETH	LAW-AW (See note 1)	15*



GUN DRIVE

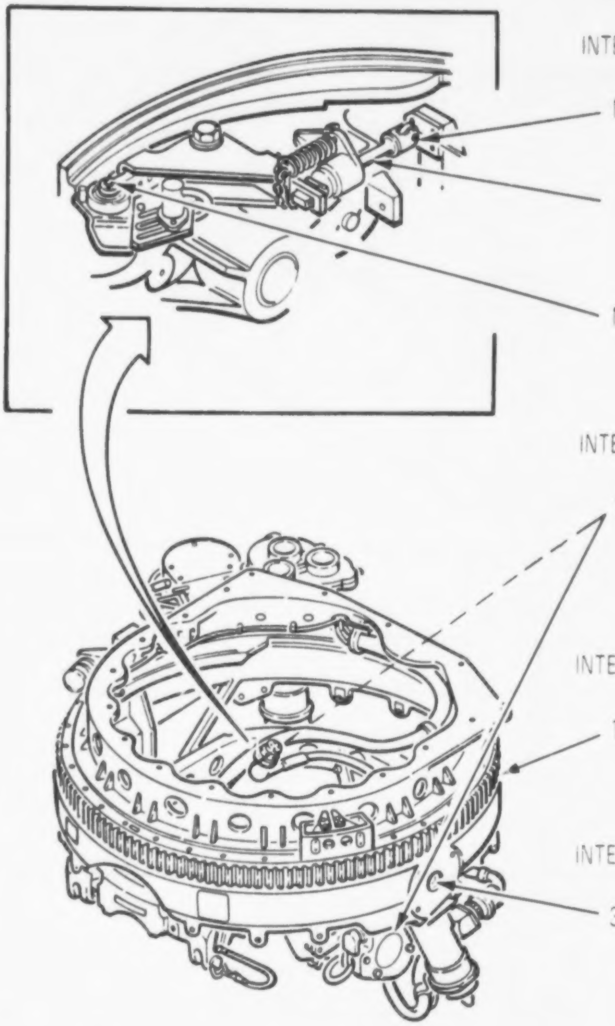
TOTAL MAN-HR		TOTAL MAN-HR
INTERVAL	MAN-HR	
-	N A	
15	0.5	

KEY

LUBRICANT	REFILL CAPACITY (APP)	EXPECTED TEMPERATURE			[illegible]	INTERVAL
		Above +32°F	+40°F to −10°F	0°F to −65°F		
LAW AW (DOD L 85336) Lubricant all weather automatic weapons)	As req	All temperatures				* [illegible] 15 15,000 rounds cycled

NOTES

1. GEARS – Every 15,000 rounds cycled or 90 days, coat all gear teeth with lubricant (LAW-AW).



INTERVAL	LUBRICANT	
M•	LAW-AW (See note 3)	PIN
15	GIA (See note 2)	SHAFT AND YOKE
M•	LAW-AW (See note 3)	PIN

INTERVAL	LUBRICANT	
15	GIA (See note 2)	BEARINGS

INTERVAL	LUBRICANT	
15	LAW-AW (See notes 1 and 2)	GEAR

INTERVAL	LUBRICANT	
30	GIA (See notes 4 and 5)	GEARS

TURRET ASSEMBLY

See page 3-2.9 for notes.

TOTAL MAN-HR		TOTAL MAN-HR
INTERVAL	MAN-HR	
•	N/A	
M	0.1	
15	0.7	
30	0.5	

KEY

LUBRICANT		REFILL CAPACITY (APP)	EXPECTED TEMPERATURE				INTERVAL	
			Above +32°F	+40°F to 10°F	0°F to -65°F			
LAW-AW (DOD-L-85336)	Lubricant, all weather (automatic weapons)	As req	All temperatures			For arctic operation refer to TM9-207		During reassembly or installation
GIA (MIL-G-23827)	Grease, instrument aircraft	As req					M	Monthly
							15	15,000 rounds cycled
							30	30,000 rounds cycled

NOTES

1. CLEANING RING GEAR – Before lubricating, use a small bristle brush to remove embedded grit and dirt.

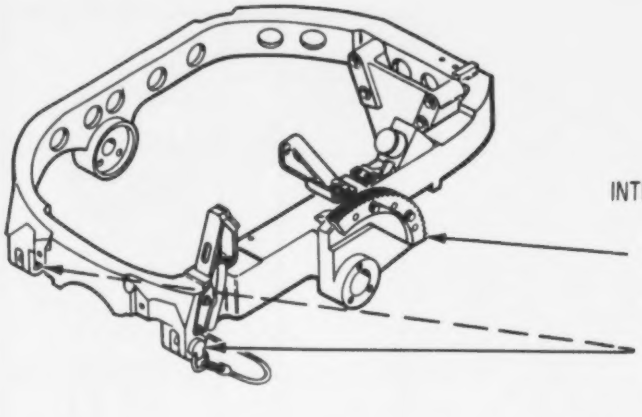
2. RING GEAR, SHAFT AND YOKE – Every 15,000 rounds or 30 days, lightly coat ring gear with lubricant (LAW-AW) and coat bearing and shaft and yoke with grease (GIA).

3. PINS – Every 30 days, lubricate pins with lubricant (LAW-AW).

4. CLEANING GEARS – Before lubricating, use a lint-free cloth and a small bristle brush to remove old grease.

5. GEARS – Every 30,000 rounds or 180 days, use a small bristle brush to apply a film of grease (GIA) to gear teeth only. DO NOT OVERLUBRICATE. After application, rotate gears through one complete revolution. Use grease squeezed from between gear teeth to protect non-contact surfaces of gears from corrosion.

6. Refer to TM 9-1090-206-30 for aviation intermediate maintenance lubrication points.



INTERVAL	LUBRICANT	
15	GIA (See note 1)	GEAR
15	LAW-AW (See note 1)	PIN

WEAPON SADDLE ASSEMBLY

TOTAL MAN-HR		TOTAL MAN-HR
INTERVAL	MAN-HR	
15	0.5	

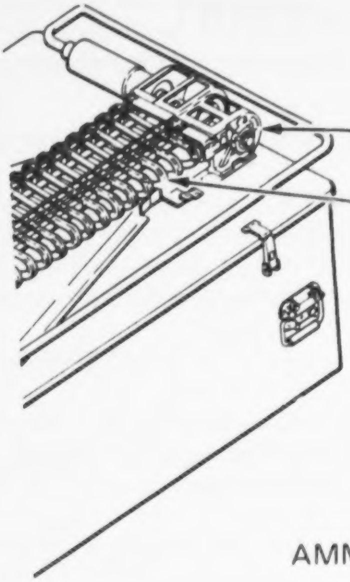
KEY

LUBRICANT	REFILL CAPACITY (APP)	EXPECTED TEMPERATURE			For arctic operation refer to TM9-207	INTERVAL
		Above +32°F	+40°F to 10°F	0°F to -65°F		
GIA – Grease, instrument (MIL-G-23827) aircraft	As req		All temperatures			15 – 15,000 rounds cycled
LAW-AW – Lubricant, all-weather (automatic weapons) (DOD-L-85336)	As req		All temperatures			15 – 15,000 rounds cycled

NOTES

1. GEAR AND PIN – Every 15,000 rounds, coat gear teeth with grease (GIA) and coat pins with lubricant (LAW-AW).

2. CLEANING GEAR – Before lubricating, use a small bristle brush to remove embedded grit and dirt from gear and mating gear cluster.



INTERVAL	LUBRICANT	
1.5*	PL-S (See note 1)	BOOSTER HOUSING
1.5*	PL-S (See note 1)	FEED CHUTE

AMMUNITION FEED SYSTEM

TOTAL MAN-HR		TOTAL MAN-HR
INTERVAL	MAN-HR	
*	N/A	
1.5	0.5	

KEY

LUBRICANT	REFILL CAPACITY (APP)	EXPECTED TEMPERATURE			For arctic operation refer to TM9 207	INTERVAL
		Above +32°F	+40°F to 10°F	0°F to -65°F		
PL-S — Lubricating oil, (VV-L-800) general purpose preservative	As req	All temperatures				* — During reassembly or installation 1.5 — 1500 rounds cycled

NOTES

1. BOOSTER HOUSING AND FEED CHUTE — Every 1500 rounds cycled or 10 days, coat exposed surfaces with lubricating oil (PL-S). After application, wipe off excess oil.

2. Refer to TM 9-1090-206-30 for aviation intermediate maintenance lubrication points.

Section II. REPAIR PARTS, SPECIAL TOOLS; TEST MEASUREMENT, AND DIAGNOSTIC EQUIPMENT (TMDE); AND SUPPORT EQUIPMENT

Section Contents	Para
Common Tools and Equipment	3-1
Special Tools, TMDE, and Support Equipment	3-2
Repair Parts	3-3

COMMON TOOLS AND EQUIPMENT

3-1. For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit, SC 5180-95-CL-B09 and SC 5180-95-CL-B10.

SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

3-2. The special tools, TMDE, and support equipment required to perform the aviation unit maintenance tasks authorized by the maintenance allocation chart (MAC) are listed and illustrated in TM 9-1090-206-23P, the repair parts and special tools list for this equipment. The tools which must be fabricated by aviation unit maintenance are listed and illustrated in Appendix E.

REPAIR PARTS

3-3. Repair parts are listed and illustrated in the repair parts and special tools list, TM 9-1090-206-23P, covering aviation unit maintenance for this equipment.

Section III. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

Section Contents	Para
General	3-4
Expendable Supplies and Materials	3-5
Responsibility	3-6
Preventive Maintenance Checks and Services	3-7

GENERAL

3-4. Preventive maintenance is systematic care, inspection, and service of equi
in serviceable condition and to detect faults and failures before extensive and time
or replacements become necessary.

EXPENDABLE SUPPLIES AND MATERIALS

3-5. Consumable supplies and materials are listed in Appendix D in alphabetical order. Each consumable has an item number assigned for ease of location and reference. When an item number is unknown you may locate any consumable used in this manual through its alphabetical arrangement. Consumables are referenced in the narrative by name and item number,e.g. adhesive (item 1, Appx D).

RESPONSIBILITY

3-6. Preventive maintenance is a responsibility of aviation unit maintenance and is further defined by unit policies. To make certain that maintenance is accomplished when due, a record of rounds cycled through the turret subsystem must be maintained on DA Form 2408-4.

PREVENTIVE MAINTENANCE CHECKS AND SERVICES

3-7. Preventive maintenance checks and services performed by aviation unit maintenance on the turret subsystem are either time-dependent or rounds-dependent. The schedule prescribed for each check or service will be considered the minimum requirement for operation of the turret subsystem under usual conditions. Unusual operating conditions, such as extreme temperatures, dust or sand, moist or salty atmosphere, and rain or snow, require more frequent checks and services. Perform HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP, para 2-6, before performing any preventive maintenance check or service. If a preventive maintenance check has not been performed within a 7-day period preceding operation, it will be performed prior to operation.

TIME-DEPENDENT CHECKS AND SERVICES

Time-dependent checks and services consist primarily of inspection checks to make certain that the turret subsystem is in an operational condition. These checks and services will normally be performed daily (when the turret subsystem has been operated) or monthly (if the turret subsystem has not been operated).

ROUND-DEPENDENT CHECKS AND SERVICES

Round-dependent checks and services are performed to make certain that parts subject to adjustment variations, wear, or sudden failure are inspected, adjusted, or replaced before overall turret subsystem performance is affected. These checks and services will be performed strictly as scheduled, after the turret subsystem has fired or cycled (as applicable) the number of rounds specified for each item. Rounds cycled through the turret subsystem include those fired, as well as those that are cycled through the M197 gun and ejected unfired.

ROUTINE PROCEDURES

Inspection checks will be made to determine if items are in good condition, correctly assembled or stored, secured, not excessively worn, and adequately lubricated. Any or all of these checks that are pertinent to any item (including supporting, attaching, or connecting members) will be performed automatically as routine procedures in addition to any specific procedures given.

Corrosion. Inspect metal, rubber and plastic for corrosion or deterioration (cracking, softening, swelling, or breaking). Replace authorized parts or forward to next higher level of maintenance for repair, if required.

Good Condition. Inspection for "good condition" is usually a visual inspection to determine that the unit is not damaged beyond a safe or serviceable condition. Good condition means that a component or part is not bent or twisted, chafed or burred, bare or frayed, dented or collapsed, torn or cut, or deteriorated.

Correct Assembly. Inspection of an item to see if it is correctly assembled or stowed is usually a visual inspection to determine that the item is in its normal position and that all of its parts are present and in their correct relative positions.

Secure Mounting. Inspection of an item to determine if it is secure is usually a visual examination or a check by hand or wrench, for looseness. Such an inspection must include any brackets, locknuts, lockwire, cotter pins as well as any connecting cables and wires.

Excessively Worn. This means worn beyond serviceable limits or to the point likely to result in failure if the item is not replaced before the next scheduled inspection. Refer to the pertinent sections in this chapter for parts inspection data. It also includes illegible markings, data, identification plates, and printed matter.

Tighten. When the instruction "tighten" appears in a procedure, it means tighten with the appropriate tool (wrench, screwdriver, etc.), even though the item appears to be secure.

SPECIFIC PROCEDURES

Specific time-dependent and rounds-dependent preventive maintenance checks and services to be performed are listed in the following tabulated data.

AVUM PREVENTIVE MAINTENANCE CHECKS AND SERVICES

The Item No. column specifies the logical order of performance. This column will be used as a source of item numbers for the TM Number column on DA Form 2404, Equipment Inspection and Maintenance Worksheet, in recording preventive maintenance checks and services.

The interval column designates the intervals at which the procedures are to be performed. B means before, D means during operation, W means weekly, M means monthly, Q means quarterly, H means helicopter operating hours, and RD means rounds fired or cycled (as applicable). The dots indicate the items to be inspected and the procedure to be performed.

The Item To Be Inspected column lists the items that require period checks and services.

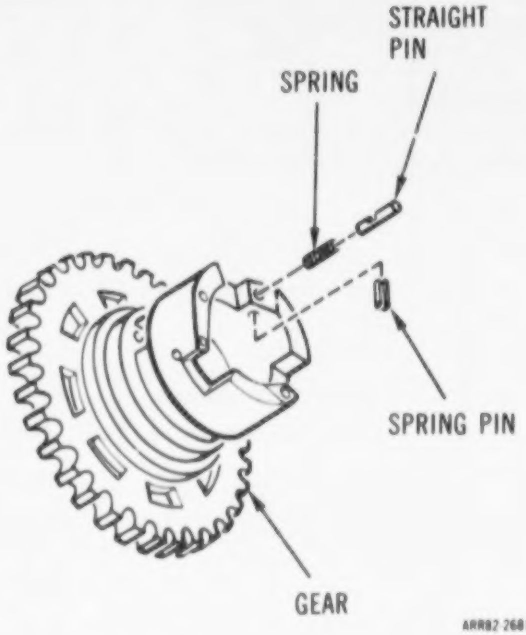
The Procedure column describes the maintenance checks and services to be performed.

B — Before
D — During Operation
W — Weekly
M — Monthly
Q — Quarterly
H — Hours
RD — Rounds

Item No.	Interval							Item To Be Inspected	Procedures
	B	D	W	M	Q	H	RD		
1	•				•			Armament Subsystem	Perform TURRET SUBSYSTEM PREOPERATIONAL CHECK, para 2-8.
2	•				•			Armament Subsystem	Perform QUICK CHECK BORESIGHT, para 2-9.
3	•				•			Armament Subsystem	Perform ROCKET LAUNCHER ALINEMENT, para 2-10.
4		•						Armament Subsystem	Check dynamic accuracy during firing. Projectiles should impact selected target.
5					•		15000	Recoil Adapter	Perform REPAIR OF RECOIL ADAPTER, para 3-55.
6					•		15000	Slider	Perform REPAIR OF SLIDER, para 3-55.1.
7	•						30000	Recoil Adapter	Recoil adapter preload must be checked before operation unless a check has been performed during previous three months. Notify aviation intermediate maintenance to check recoil adapter preload in accordance with TM 9-1090-206-30.
8				•				Elevation Drive Clutch	Release elevation drive motor brake and move barrel cluster up and down two or three times to make certain that elevation drive system is free to move. Position barrel cluster in elevated position and apply elevation drive motor brake. Attach one end of a spring scale to end of barrel cluster and apply a steady downward vertical force to other end of scale. Barrel cluster should not move (clutch slip) with an applied force of 50 pounds or less. There may be a brief maximum reading on the spring scale. This is initial breakaway force, not the clutch slippage. The clutch slippage must be determined while the barrel cluster is in a downward motion. The preferred clutch slippage point is 63 lbs plus or minus 12 lbs. If clutch slips, notify aviation intermediate maintenance to repair/replace clutch. When check is completed, release elevation drive brake; position barrel cluster in stow position; and apply elevation drive brake.
9				•				Turret Cable Assemblies	Check turret cable assemblies for cut, damaged, or missing harness wrap; cut or torn cable covering; missing clamps, brackets, or cable ties; damaged connectors; and bent connector pins.
10				•				Feed Chute	Check feed chute for freedom of movement, worn or damaged sections, and secure mounting.
11						150		Armament Subsystem	Notify aviation intermediate maintenance to boresight the armament subsystem in accordance with TM 9-1090-206-30.
12						150		Armament Subsystem	Perform 150 HOUR ARMAMENT SUBSYSTEM CHECK, Appx G.
13						150		Azimuth Clutch	Notify aviation intermediate maintenance to check Az clutch in accordance with TM 9-1090-206-30

M89E1 FEEDER PREVENTIVE MAINTENANCE — ROUNDS DEPENDENT

Item No.	Rounds Interval	Item to be Inspected/Procedure
1	Every 9,375	Antibacklash Pin Replace spring pin, straight pin, and spring (three places).
2	Every 9,375	T-Bar Guide Check rail for excessive wear (edges worn through). Replace if defective.
3	Every 18,750	Stripper Replace stripper and mounting screws.
4	Every 18,750	Bearing Retainer Mounting Screws Replace.
5	Every 37,500	T-Bar Guide Replace.
6	Every 37,500	Wedge Replace.
7	Every 37,500	Rotating Vane Replace.
8	Every 37,500	Clutch Lock Replace.



ARR82-26813

M197 GUN PREVENTIVE MAINTENANCE — ROUNDS DEPENDENT

NOTE

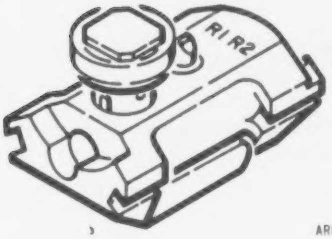
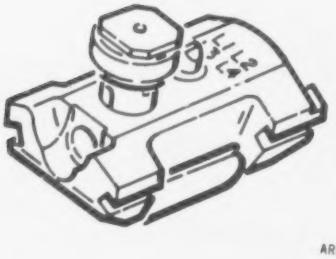
Barrels should be inspected when received from supply or another unit.

Item No.	Rounds Interval	Item to be Inspected/Procedure
1	Every 5,000 until bore erosion reaches 0.035	Barrels Replace when: Bore erosion measures 0.050 or more. Pitting in muzzle end of barrel exceeds 10 percent of surface. When signs of corrosion appear in pits. Perform bore erosion check/visual inspection of muzzle end interior every 5,000 rounds. (See task notes.) After erosion reaches 0.035, perform bore erosion check/visual inspection of muzzle end interior every 1,500 rounds. (See task notes.)

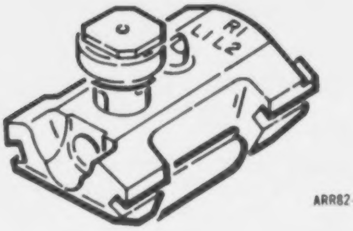
Measured bore erosion wear (scale reading)	Expected Burst Length 50	100	150	200	Maximum Burst
0.0	30,000	27,000	25,000	24,000	600
0.010	26,000	24,000	22,000	21,000	550
0.020	23,000	21,000	19,000	18,000	500
0.030	18,000	17,000	16,000	15,000	500
0.040	13,000	12,000	11,000	10,000	450
0.050	0	0	0	0	0

Data base on 1/2 minute interval between bursts. Replace at 0.050 or when there is excessive pitting/corrosion. Maximum burst lengths are considered to be one continuous burst or an accumulation of short bursts without significant cooling between bursts (i.e, 1/2 minute).

Item No.	Rounds Interval	Item to be Inspected/Procedure
2	Every 15,000	Muzzle Clamp Plate Clean, inspect, and repair or replace as necessary.
3	Every 15,000	Muzzle Clamp Plate Bolt and Self-Locking Nut Clean, inspect, or replace as necessary. Check breakaway torque of bolt and self-locking nut when muzzle clamp plate is removed. End of bolt must extend three to five threads beyond end of self-locking nut to obtain a valid torque reading. Replace bolt and self-locking nut if breakaway torque is less than 90 lb-in. (10.2 N.m).
4	Every 15,000	Mid-Barrel Clamp Clean, inspect, and repair or replace as necessary.

Item No.	Rounds Interval	Item to be Inspected/Procedure
5	Every 15,000	Breech Bolts (PN 11010157) Replace bolt shaft, spring pin, locking block, contact stop, firing pin cam, firing pin, firing pin spring, firing pin insulator, and firing pin cam insulator. These parts are not interchangeable with parts for breech bolt PN 11691422. Mark breech bolts R1 for 15,000-round rebuild and R2 for 30,000-round rebuild.  ARR82 26814 **NOTE** **Service breech bolts 11010157 in accordance with 15,000 to 30,000-round requirements upon removal from M197 gun. (See item 23 for 45,000-round replacement.) Mark breech bolts with etcher vibrator as used parts and indicate remaining rounds service life. Identify breech bolts as a set and store together until required for installation; these parts will be installed only as a set. Breech bolts PN 11010157 and PN 11691422 will not be intermixed as a set. After installation, continue to service breech bolts in accordance with scheduled maintenance requirements.**
6	Every 15,000	Breech Bolts (PN 11691422) Replace spring pin and locking block. These parts are not interchangeable with parts for breech bolt PN 11010157. Mark breech bolts L1 for 15,000-round maintenance, L2 for 30,000-round maintenance, L3 for 60,000-round maintenance, and L4 for 75,000-round maintenance.  ARR82 26815 **NOTE** **Service breech bolts 11691422 in accordance with 15,000 to 75,000-round requirements upon removal from M197 gun. (See item 24 for 45,000-round servicing and item 34 for 90,000-round replacement.) Mark breech bolt with etcher vibrator as used parts and indicate remaining rounds service life. Identify breech bolts as a set and store together until required for installation; these parts will be installed only as a set. Breech bolts PN 11010157 and PN 11691422 will not be intermixed as a set. After installation, continue to service breech bolts in accordance with scheduled maintenance requirements.**

Item No.	Rounds Interval	Item to be Inspected/Procedure
7	Every 15,000	Bearing Retainer Inspect and replace if necessary. Retorque mounting bolts to 250 — 300 lb-in. (28 — 34 N.m).
8	Every 15,000	Firing Contact Clean, inspect, and repair or replace as necessary.
9	Every 15,000	Guide Bar Mounting Spring Pins Replace.
10	Every 15,000	Rotor Housing Clean, inspect, and replace if necessary. Retorque upper and lower housing mounting bolts to 90 — 100 lb-in. (10 — 11 N.m).
11	Every 15,000	Front Unlocking Cam Check for proper mounting. Retorque mounting bolts to 250 — 300 lb-in. (28 — 34 N.m).
12	Every 15,000	Rear Unlocking Cam Check for proper mounting. Retorque mounting bolts to 250 — 300 lb-in. (28 — 34 N.m).
13	Every 15,000	Cam Lock Mounting Bolts Check for damaged or defective threads.
14	Every 15,000	Ball Bearing Notify next higher maintenance level to lubricate ball bearing.
15	Every 15,000	Needle Bearing Notify next higher maintenance level to lubricate needle bearing.
16	Every 15,000	Laminated Shim Inspect.
17	Every 15,000	Rotor Gear Inspect gear and retorque mounting screws to 30 — 40 lb-in. (3.4 — 4.5 N.m)
18	Every 30,000	End Plate Clean, inspect, and repair or replace as necessary.
19	Every 30,000	Firing Contact Replace.
20	Every 30,000	Rotor Housing Replace spring pins used to position upper and lower housings.
21	Every 30,000	Rotor Notify next higher maintenance level to visually inspect rotor for defects; to replace bolt head locks, RH front tracks, LH front tracks, front track mounting bolts, and front track screws; to clean, inspect, and repair or replace doubler plate, doubler plate mounting screws, leaf springs, and rotor stops as necessary; and to clean and inspect needle bearing.
22	Every 30,000	Indexing Pin Clean, inspect, and repair or replace as necessary.

Item No.	Rounds Interval	Item to be Inspected/Procedure
23	Every 45,000	Breech Bolts (PN 11010157) Replace. **NOTE** **Identify breech bolts as a set and store together until required for installation; these parts will be installed only as a set. Breech bolts PN 11010157 and PN 11691422 will not be intermixed as a set. After installation, continue to service breech bolts in accordance with scheduled maintenance requirements.**
24	Every 45,000	Breech Bolts (PN 11691422) Replace bolt shaft, spring pin, locking block, plug, cam pin, firing pin, firing pin spring, horizontal insulator and vertical insulator. Mark breech bolts R1 for 45,000-round rebuild.  ARR82-26816
25	Every 45,000	Bearing Retainer Clean, inspect and repair or replace bearing retainer as necessary and replace mounting bolts.
26	Every 45,000	Coupling Clamp Check for proper mounting. Retorque nut to 90 — 100 lb-in. (10 — 11 N.m).
27	Every 45,000	Firing Contact Replace mounting screws.
28	Every 45,000	Guide Bar Replace guide bar and mounting spring pins.
29	Every 45,000	Front Unlocking Cam Clean and inspect. Replace as necessary. Replace mounting bolts.
30	Every 45,000	Rear Unlocking Cam Clean and inspect. Replace as necessary. Replace mounting bolts.
31	Every 45,000	Cam Lock Replace cam lock and mounting bolts.
32	Every 45,000	Center Tracks Notify next higher maintenance level to replace center tracks and mounting bolts.
33	Every 45,000	Removable Tracks Notify next higher maintenance level to replace removable tracks and inspect removable track spacers, track lock pins, and retaining rings.

Item No.	Rounds Interval	Item to be Inspected/Procedure
34	Every 90,000	Breech Bolts (PN 11691422) Replace breech bolts unless M197 gun is also due for 90,000 round replacement.

NOTE

Identify breech bolts as a set and store together until required for installation; these parts will be installed only as a set. Breech bolts PN 11010157 and PN 11691422 will not be intermixed as a set. After installation, continue to service breech bolts in accordance with scheduled maintenance requirements.

Item No.	Rounds Interval	Item to be Inspected/Procedure
35	Every 90,000	M197 Gun Return to depot for overhaul.

Task Notes

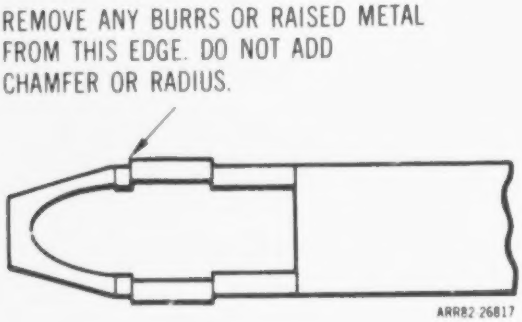
Uninstalled Barrels

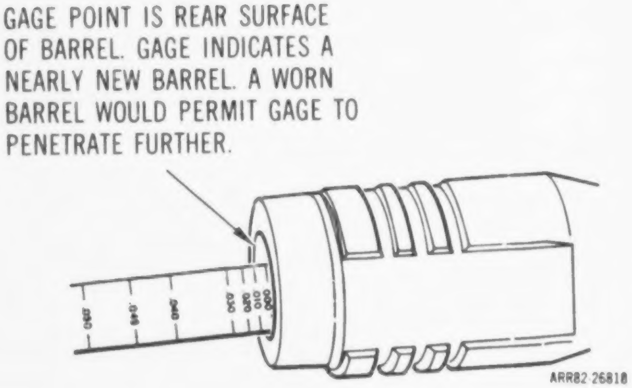
1. INSPECT BORE EROSION GAGE.
   a. Visually check gage head for any burrs or raised metal particles.
   b. Wipe bore erosion gage with a clean lint-free cloth to remove any dirt.

2. INSPECT AND CLEAN BARRELS.
   a. Inspect barrels before gaging.
   b. Clean bore of each barrel thoroughly. Check bore using a suitable light source or by means of a cleaning patch or a piece of white paper inserted into breech opening to reflect light into the bore.

3. MEASURE BARREL BORE EROSION.
   a. Insert bore erosion gage into breech of barrel. Read bore erosion by alining gage with rear surface of barrel.
   b. Rotate bore erosion gage 90° and read gage again to detect oval wear. Always use maximum reading to determine barrel life.

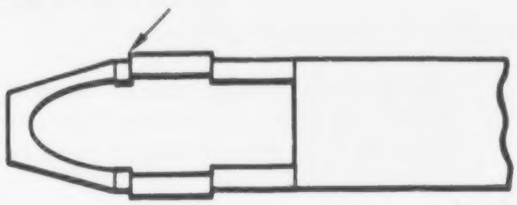
Bore Erosion Check


REMOVE ANY BURRS OR RAISED METAL FROM THIS EDGE. DO NOT ADD CHAMFER OR RADIUS.
ARR82 26817


GAGE POINT IS REAR SURFACE OF BARREL. GAGE INDICATES A NEARLY NEW BARREL. A WORN BARREL WOULD PERMIT GAGE TO PENETRATE FURTHER.
000
010
020
030
ARR82 26818

Installed Barrels

1. INSPECT BORE EROSION GAGE.
   a. Visually check gage head for any burrs or raised metal particles.
   b. Wipe bore erosion gage with a clean lint-free cloth to remove any dirt.



REMOVE ANY BURRS OR RAISED METAL FROM THIS EDGE. DO NOT ADD CHAMFER OR RADIUS.

ARR82-26819

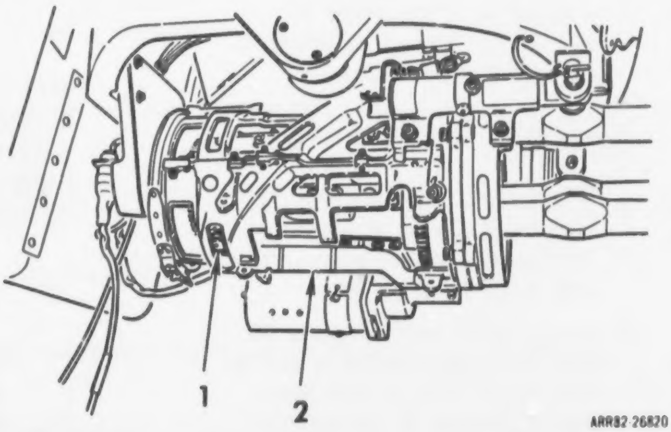
2. REMOVE M89E1 FEEDER. SEE REMOVAL/INSTALLATION OF M89E1 FEEDER, PARA 3-41.

NOTE

Barrels should be cool and clear of any contaminants that would interfere with bore erosion gage.

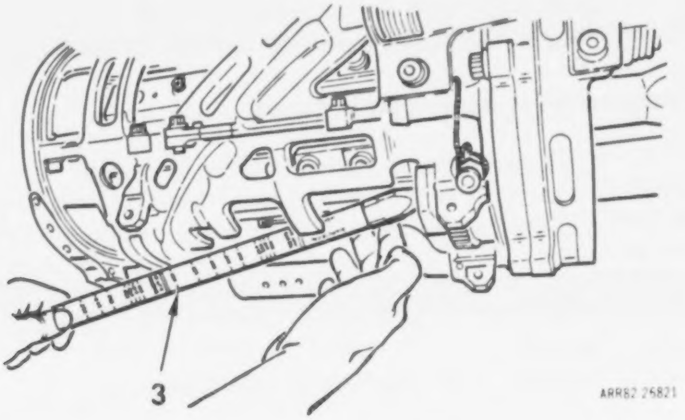
3. INSPECT AND CLEAN BARRELS.
   a. Inspect barrels before gaging.
   b. Clean bore of each barrel thoroughly. Check bore using a suitable light source or by means of a cleaning patch or a piece of white paper inserted into breech opening to reflect light into bore.

4. MEASURE BARREL BORE EROSION.
   a. Rotate barrel cluster of M197 gun until a breech bolt (1) is in rear dwell area of main cam path on feed side of guide bar (2).



ARR82-26820

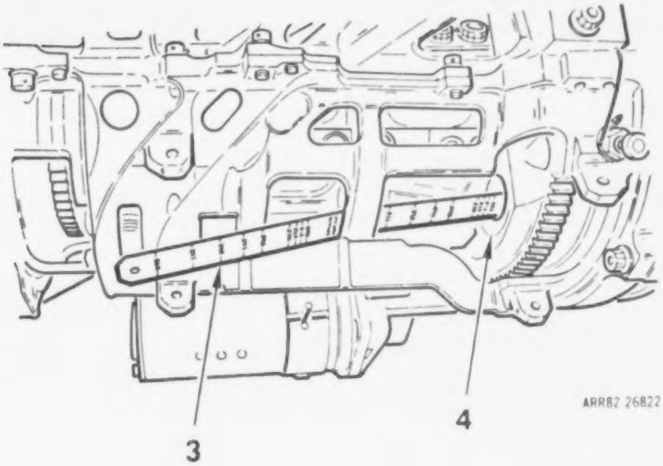
b. Insert bore erosion gage (3) into breech of barrel.



c. Read bore erosion by alining bore erosion gage (3) with rear surface of barrel (4).

d. After barrels have passed bore erosion test, visually check inside muzzle end for evidence of pitting or corrosion (red or black deposits in the pits).

e. Repeat steps a through d for remaining two barrels.



5. INSTALL M89E1 FEEDER, SEE REMOVAL/INSTALLATION OF M89E1 FEEDER, PARA 3-41.

Barrel Replacement Criteria

1. Replace barrels when:
   a. Erosion reaches 0.050.
   b. Pitting in muzzle end area reaches 10 percent or more.
   c. Corroded pits are 0.032 or deeper.

Barrels will always be replaced in sets.

2. The wear reading of the worst barrel in a set will be used to determine the extent of erosion and the need for replacement.

3. Barrels will be replaced in accordance with the tabulated data for item 1 using the wear reading and the expected burst length as criteria.

4. Used barrels may be made into sets in which all the barrels are worn within 0.010 inch of each other. The remaining life of these sets will be estimated using the tabulated data for item 1. The barrel sets may then be installed for further use.

Destruction of Unserviceable Barrels

1. Cut unserviceable barrels into three pieces.
2. Cut each piece lengthwise into two pieces.

RECOIL ADAPTER AND SLIDER PREVENTIVE MAINTENANCE — ROUNDS DEPENDENT

Item No.	Rounds Interval	Item to be Inspected/Procedure
1	Every 60,000	Recoil Adapter Replace.

TURRET PREVENTIVE MAINTENANCE — ROUNDS DEPENDENT

Item No.	Rounds Interval	Item to be Inspected/Procedure
1	Every 500,000	Turret Return to depot for overhaul.

Section IV. GENERAL MAINTENANCE INSTRUCTIONS

Section Contents	Para
Scope	3-8
Preparation	3-9
Cleaning	3-10
Inspection	3-11
Repair	3-12

SCOPE

3-8. This section contains selected general preparation, cleaning, inspection, and repair information and instructions for aviation unit maintenance personnel. For complete general maintenance instructions, refer to TM 55-1500-204-25/1.

PREPARATION

3-9. The steps and precautions that must be followed to prepare the turret subsystem for maintenance are provided in the following paragraphs.

PERSONNEL SAFETY

Proper care will be exercised when handling the turret subsystem, and its components and parts. Many components are heavy and personnel should not try to handle them by hand. The assistance of another person, a lifting device, or other support equipment is needed. Make certain that all lifting devices are in good working order. Personnel should remove wrist watches, rings, identification bracelets, etc. Safety glasses (goggles) will be worn to protect the eyes. Hearing protection devices will be worn in high noise level areas.

EQUIPMENT

Obtain the proper equipment before beginning maintenance. This equipment includes hand tools and special tools, support equipment, test equipment, receptacles for small parts, work tables, wood blocks, consumable materials, and wiping cloths. Refer to Section II for common and special tools, TMDE, support equipment, and repair parts.

HANDLING TECHNIQUES

Avoid damage to parts and components when performing any maintenance task. Damage caused by careless handling can cause improper functioning. Repair or replace all defective parts.

TORQUING

When torquing is required, the torque requirements are indicated in the task relating to the specific part. General information for torquing and standard torque values are contained in Appendix F.

CLEANING

3-10. General cleaning procedures are provided in the following paragraphs. Special cleaning procedures are covered in the task relating to the specific part.

GENERAL CLEANING WARNINGS AND CAUTIONS

WARNING

Do not use cleaning solvents near an open flame. Fire extinguishers will be available when these materials are used. Use only in well-ventilated areas.

WARNING

Use and disposal of flammable and toxic materials will be in accordance with applicable regulations.

WARNING

Cleaning solvents evaporate quickly and have a drying effect on the skin. Gloves will be worn to avoid cracks in the skin, and in some cases mild irritation or inflammation of the skin.

CAUTION

Petroleum based solvents or vapor degreasers will not be used to clean any parts other than those specified herein. These solvents may cause damage to paint, plastics, and rubber.

CAUTION

Solvents such as acetone, toluene, or trimethylene oxide will not be used to clean polycarbonate (Lexan) ammunition feed system components.

CAUTION

Electrical and electronic components will not be cleaned by immersion.

Recoil adapters will not be cleaned by immersion.

Components that contain bearings will not be cleaned by immersion.

CAUTION

Cleaning and lubrication are required for the M197 20-mm and M89E1 feeder after every firing exercise regardless of the number of rounds fired.

CAUTION

Special attention will be given to components and parts subject to powder residue.

GENERAL CLEANING INSTRUCTIONS

Be careful when performing any cleaning procedure. Dirt can damage parts and cause malfunctions. Observe the following instructions when performing cleaning.

1. Clean all parts before inspection, after repair and before assembly.
2. Keep hands free of grease; grease collects dirt.
3. Never use abrasives, files, scrapers, wire brushes, or sharp tools on surfaces where the finish is important to the operation or sealing of parts.
4. Gloves will be worn when handling clean polished parts.

NOTE

Cleaning materials are not lubricants. Parts requiring lubrication will be dried and lubricated or preserved in accordance with para 3-0.

5. Clean polished parts will be lubricated immediately after cleaning to prevent rusting.
6. Cover and wrap parts after cleaning to protect them from dirt.
7. Clean and lubricate new bearings. Bearings that have been in service should be relubricated. Bearings require special cleaning techniques. Refer to TM 9-214 for cleaning, lubrication, and maintenance procedures for roller bearings, needle bearings, and ball bearings.
8. Use solvent (item 12, Appx D) to clean or remove grease and oil from all metal parts, except those exposed to powder residue. This solvent does not readily dissolve corrosive salts from powder and primer compositions. Use soap and water or solvent (item 12, Appx D) to clean polycarbonate (Lexan) ammunition feed system components.
9. Scrub surfaces subjected to powder residue with a non-metallic, bristle brush saturated with cleaning compound (item 2, Appx D) prior to cleaning with solvent (item 12, Appx D).
10. Scrub the bore and chamber of each gun barrel using a cleaning staff with a phosphor bronze brush saturated with cleaning compound (item 2, Appx D). After all deposits have been removed, wipe bore and chamber dry.
11. When authorized to install new parts, remove any preservative materials such as rust-preventive compound or grease. Lubricate parts requiring lubrication in accordance with para 3-0.

INSPECTION

3-11. General inspection procedures are provided in the following paragraphs. Special inspection procedures are covered in the task relating to the specific part.

BEARINGS

Inspect bearings. Refer to TM 9-214 for inspection procedures for roller bearings, needle bearings, and ball bearings.

BEARING RETAINERS

Inspect bearing retainers for wear, deformation, cracks, and breaks.

BRACKETS

Inspect brackets for bends, cracks, and breaks.

COVERS

Inspect covers for bends, cracks, and breaks.

CABLE ASSEMBLIES

Inspect cable covering for cuts, tears, or abrasion. Inspect connectors for damage.

CABLE CLAMPS

Inspect cable clamps for deformation, cracks, or breaks.

ELECTRICAL CONNECTORS

1. Inspect pins and receptacles for bends, deformation, breaks, loose fit, and corrosion.
2. Inspect connector body, coupling ring, and backshell for deformation, cracks, and breaks.
3. Inspect insert for cracks and breaks.

GEARS AND GEARSHAFTS

Inspect gears, and gearshafts for burrs, wear, cracked, broken or missing teeth, and pitting at tooth contact areas.

GUIDES

Inspect guides for bends, deformation, cracks, and breaks.

HOUSINGS

1. Inspect housings for cracks, deformation, breaks, and warped mating surfaces.
2. Use a magnifying glass and a strong light to check for cracks. Check area next to threaded inserts, sharp corners, and fillets.
3. Inspect machined surfaces for nicks, burrs, and raised material. Mark damaged areas for repair.
4. Use a straight edge to check all mounting flanges on housings for straightness.

INSERTS

1. Inspect inserts for cracks and stripped or damaged threads.
2. Check inserts for a loose fit.

QUICK-RELEASE PINS

Inspect quick-release pins for wear and broken or missing parts.

SHAFTS

Inspect shafts for burrs, wear, binding, scoring, galling, twisting, cracks, and breaks.

SNAP RINGS

Inspect snap rings for nicks, burrs, deformation, wear, and loss of tension.

SPLINED PARTS

Inspect splined parts for burrs, wear, and twisted, cracked, or broken splines.

SPRINGS

Inspect springs for deformation, cracks, breaks, and loss of tension.

SPROCKETS

Inspect sprockets for wear, bends, deformation, cracks, or breaks.

STENCILS

Check stencils for illegible or missing data.

SWITCHES

Inspect switches for broken or missing parts and loss of mechanical action.

THREADED PARTS

1. Inspect threaded parts for bends, cracks, breaks, corrosion, and worn, stripped, or damaged threads.

2. Inspect heads on screws and bolts for deformation.

3. Inspect wrench flats on nuts for deformation.

TIMING PINS

Inspect timing pins for bends, cracks, and breaks.

REPAIR

3-12. General repair instructions and procedures are provided in the following paragraphs. Special repair instructions and procedures are provided in the task related to the specific part. Clean all parts after repair is completed.

GENERAL REPAIR INSTRUCTIONS

Repair consists of replacing damaged or malfunctioning components found during inspection and/or troubleshooting. Removal of subassemblies and/or components is to be performed only to the extent necessary to accomplish the required repair. Good judgement should be exercised to keep disassembly and assembly operations to a minimum.

Care must be exercised to use tools that are suitable for the task in order to avoid mutilation of parts or damage to tools.

Use the double-twist method of lockwiring. Use wire twisters to twist lockwire. Lockwire will always be installed and twisted so that the loop around the head stays down. It should not come up over the bolt head, causing a slack loop. Extreme care must be used when twisting wires together to insure that they are tight but not overstressed to the point where breakage will occur under slight load or vibration. New lockwire will be used on each application.

Self-locking nuts, bolts, screws, and other retaining devices, such as spring pins and cotter pins, that are removed during maintenance will be discarded and new parts will be used.

Screw thread inserts will not be removed unless replacement is required.

BEARINGS

1. Refer to TM 9-214 for maintenance procedures for roller bearings, needle bearings, and ball bearings.

2. Replace bearings if defects are found.

BEARING RETAINERS

Replace bearing retainers that are deformed, cracked, or broken.

BRACKETS

1. Straighten bent brackets. Replace if function has been impaired.
2. Replace brackets that are cracked or broken.
3. Straighten bent covers. Replace if function has been impaired.
4. Replace covers that are cracked or broken.

CABLE ASSEMBLIES

1. Repair minor cable covering cuts, tears, or abrasions with electrical tape.
2. Repair or replace connectors if damaged. If repair or replacement of connectors is not authorized, replace cable assemblies.

CABLE CLAMPS

Replace cable clamps that are deformed, cracked, or broken.

ELECTRICAL CONNECTORS

1. Straighten bent pins.
2. Replace connector if connector body, coupling ring, insert, or backshell is cracked or broken.

GEARS AND GEARSHAFTS

1. Replace gears that have pitted, worn, cracked, broken, or missing teeth.
2. Remove sharp burrs from gear teeth with a soft honing stone.

GUIDES

Replace guides that are bent, deformed, cracked, or broken.

HOUSINGS

1. Replace housings that are cracked, warped, deformed, or broken.
2. Repair minor damage to machined surfaces with crocus cloth or a soft honing stone.

INSERTS

Replace inserts when threads are stripped or damaged, or when inserts are cracked or loose. Do not chase inserts.

best copy available

QUICK-RELEASE PINS

Replace quick-release pins that are worn, or that have broken or missing parts.

SHAFTS

1. Replace shafts that are scored, galled, twisted, cracked, or broken.
2. Remove burrs and minor surface irregularities with crocus cloth or a soft honing stone.

SNAP RINGS

Replace snap rings that are defective.

SPLINED PARTS

1. Replace splined parts that are twisted, cracked, or broken.
2. Remove burrs with a soft honing stone.

SPRINGS

Replace springs that are defective.

SPROCKETS

Replace sprockets that are bent, deformed, cracked, or broken.

STENCILS

Remark items that have illegible or incomplete stenciling.

SWITCHES

Replace switches that have broken or missing parts or that have defective mechanical action.

THREADED PARTS

1. Replace parts that have stripped threads. Replace parts that cannot be repaired by chasing threads with a used tap or die. Replace parts that cannot be repaired by installing inserts.
2. Chase damaged threads with a used tap or die of correct size. If possible, a worn tap or die should be used because a new tap may cut oversize and a new die may cut undersize.

TIMING PINS

Replace timing pins that are bent, cracked or broken.

Section V. SYSTEM TESTING AND TROUBLESHOOTING

Section Contents — Para

General 3-13
System Testing 3-14
Troubleshooting 3-15
Fault Symptom Index 3-16
Test Set Cable Connections 3-17
Sight Bypass Procedure 3-18
TSU Control of Turret Test 3-19
Proximity Switch Test 3-20
Depression Limit Test 3-21
GHS and PHS Control of Turret Test 3-22
Pilot Override Test 3-23
Acquisition Test 3-24
Fixed Forward Test 3-25
Gun Function Test 3-26
TSU Range Compensation Test 3-27
SCAS Test 3-28
Coincidence Test 3-29
Emergency Stow Test 3-30
Ammunition Handling Test 3-31

GENERAL

3-13. This section provides a fault symptom index, a task covering test set cable connections, a task describing the sight bypass procedure, and a series of tests which provide integrated system testing and troubleshooting.

SYSTEM TESTING

3-14. The system testing procedures are presented in task format and consist of a series of tests. These tests may be performed individually to check a specific function or mode of operation, or all the tests may be run consecutively to provide a complete system test. Each test provides a test of a functionally significant group of components. For example, TSU control of turret test, tests those components required to control the turret when activated from the left-hand grip on the TSU. Although some of the tests can be used to test the components covered in another test, the test title indicates the primary area of concern for that particular test.

As with all the maintenance tasks in this manual, the Initial Setup element of each test provides listings for items required or conditions that must be met before beginning any test. All tests require that the HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP be performed. This makes sure that all switches and circuit breakers are in a known condition prior to starting each test. It will not be necessary to physically disconnect auxiliary electrical power when moving from one test to another, however, the POWER REMOVAL element of the ELECTRICAL POWER APPLICATION/REMOVAL task should be followed as this task directs the technician to return all switches and circuit breakers to the setup condition. Each test will then direct which circuit breakers and switches are required for that particular test. Electrical power should always be turned off when connecting or disconnecting cables.

For certain tests, the electronics systems test set: M137 is required. When the test set is required the Equipment Conditions will direct which cables to connect. These cables should be connected before applying electrical power. The task TEST SET CABLE CONNECTIONS in this section provides instructions for connecting all the cables supplied with the test set. When the test set is used in a particular test, the supporting fault code data is supplied at the end of each test. This data provides a listing of each fault code and its corresponding corrective action.

A task called SIGHT BYPASS PROCEDURE is included in this section. This procedure allows the technician to exercise the turret to perform system tests when one or more of the sight systems or the interface control unit are inoperative or removed from the helicopter.

In addition to the tests provided in this section, Chapter 2 provides a task called TURRET SUBSYSTEM PREOPERATIONAL CHECK. This task provides an operational check of the major functions of the turret subsystem. This test can be used to verify system operational status when specific functions such as SCAS and range compensation etc. do not require testing.

Included as an appendix in this manual is a task called 150 HOUR ARMAMENT SUBSYSTEM CHECK. This is a phase related check which operationally tests all the armament subsystems which comprise the Armament Subsystem.

TROUBLESHOOTING

3-15. Troubleshooting instructions are provided as an aid in isolating and correcting malfunctions that may be encountered during operation of the turret subsystem. The more common and/or representative faults are covered but similar methods of trouble analysis and remedial action should be used to correct any specific faults not discussed.

This manual provides many tools to aid the technician in isolating and correcting faults. The following discussion provides a typical progression which shows how this manual may be used to identify, isolate, and correct malfunctions.

FAULT SYMPTOM INDEX

The fault symptom index lists the more common fault symptoms the technician may encounter. The index lists the fault symptom, then lists the recommended action or actions to be taken for that symptom, and finally references the place where that action may be found. The index may be consulted directly when the technician can define the fault symptom or symptoms. The technician then scans the list for the fault symptom or symptoms and proceeds with the recommended action until all the fault symptoms have been corrected. A more precise method to enter the fault symptom index is to run the TURRET SUBSYSTEM PREOPERATIONAL CHECK. By running this check, the technician can quickly identify problem areas and be confident that the problem was not caused by a switch or circuit breaker in the wrong position. The fault symptom index is broken into functional groups which relate to the functional groups provided in the preoperational check. Also included are fault symptoms primarily related to mechanical failures of the M197 gun, M89E1 feeder, and the turret. In most cases, the action column will direct the technician to a task or test when mechanical problems are suspected. The index will direct the technician to check certain components or conditions in accordance with the repair or removal/installation task which covers that component. System related electrical problems direct the technician to a system test or a LRU check.

SYSTEM TESTS

The system tests are series of tests which can be used in troubleshooting to isolate turret subsystem faults to a particular function. Each test covers a specific function of the turret subsystem and may be accessed from the fault symptom index or may be run to verify a function is operational in order to isolate a fault to another function. When the tests are used to troubleshoot, the abnormal indications and corrective actions columns are used to direct the technician to the most likely corrective action for the abnormal indication that was encountered. When the test set is used in the system tests, the test set provides the technician with a PASS or FAIL indication and a readout of a fault code. This fault code has a direct relationship to a specific system test point measurement under a specific system mode of operation. Each of the various test set automatic scanning and evaluation of system voltages is designed so that the primary system functions are evaluated first and the secondary (dependent upon primary) functions are evaluated later in that test sequence. Therefore, if a primary system signal fails to function, all secondary functions which require that first function will also fail. From this it can be seen that the primary function failure must be corrected first. The presentation of the fault codes by the test set is such that primary then secondary failures occur in sequence. This means that the technician must perform corrective actions in a sequence compatible with fault code presentation. Fault code data is provided at the end of each test to which it applies.

LINE REPLACEABLE UNIT CHECKS

A section is provided which uses the test set to check line replaceable units (LRU). Many of the corrective actions in the system tests require the technician to perform an LRU check. These checks use the test set to run a programmed test on each LRU. The test set will PASS or FAIL each unit under test while installed on the helicopter. Therefore, the technician when suspecting a particular LRU, can quickly confirm or eliminate that LRU by running one of these checks.

SIGHT BYPASS PROCEDURE

The sight bypass mode may be used to continue fault isolation procedures when a sight system or the interface control unit or both are inoperative. This mode can also be used to isolate the faults to one of these components. For example, if the turret is operational with the test set but can not be operated from the sight subsystems, the problem is probably with the sight subsystems or the interface control unit.

In addition to the troubleshooting procedures provided in this manual, TM 55-1520-236-T provides valuable troubleshooting information and should be used when aircraft wiring problems are suspected.

3-16. FAULT SYMPTOM INDEX

Fault Symptom	Action	Reference
GUNNER AND PILOT TURRET CONTROL		
1. Pilot and/or gunner STBY indicators do not light when MASTER ARM switch is set to STBY.	1. Perform CHECKOUT OF LOGIC RELAY ASSEMBLY. 2. Perform CHECKOUT OF GUNNER ARMAMENT CONTROL PANEL. 3. Perform CHECKOUT OF PILOT ARMAMENT CONTROL PANEL.	Para 3-40.1 Para 3-37 Para 3-38
2. HSS fails BIT check.	Troubleshoot.	TM 9-1270-212-14&P TM 55-1520-236-T
3. Turret does not follow GHS and/or PHS.	Perform GHS AND PHS CONTROL OF TURRET TEST.	Para 3-22
4. Pilot and/or gunner ARMED indicators do not light when MASTER ARM switch is set to ARM.	1. Perform CHECKOUT OF LOGIC RELAY ASSEMBLY. 2. Perform CHECKOUT OF GUNNER ARMAMENT CONTROL PANEL. 3. Perform CHECKOUT OF PILOT ARMAMENT CONTROL PANEL.	Para 3-40.1 Para 3-37 Para 3-38
5. M197 gun does not rotate when LHG and/or pilot cyclic stick action and trigger switches are depressed.	Perform GHS AND PHS CONTROL OF TURRET TEST.	Para 3-22
PILOT OVERRIDE		
6. Turret does not follow GHS when PLT ORIDE switch is on.	Perform PILOT OVERRIDE TEST.	Para 3-23
7. M197 gun does not rotate when action and trigger switches on gunner cyclic stick are depressed when PLT ORIDE switch is on.	Perform PILOT OVERRIDE TEST.	Para 3-23
8. Turret moves in response to WPN CONTR switch position when PLT ORIDE switch is ON.	Perform PILOT OVERRIDE TEST.	Para 3-20
FIXED FORWARD		
9. Turret does not aline to approximately 0° EL 0° AZ and remain steady when WPN CONTR switch is in FIXED.	Perform FIXED FORWARD TEST.	Para 3-25

FIXED FORWARD (cont)

Fault Symptom	Action	Reference
10. ARMED indicator does not light when PLT ORIDE switch is ON.	1. Perform CHECKOUT OF LOGIC RELAY ASSEMBLY.	Para 3-40.1
	2. Perform CHECKOUT OF GUNNER ARMAMENT CONTROL PANEL.	Para 3-37
11. M197 gun does not rotate from pilot cyclic stick when WPN CONTR switch is in FIXED.	Perform GUN FUNCTION TEST.	Para 3-26
TSU INTERFACE AND PROXIMITY SWITCH		
12. With MODE SELECT switch set to TSU/GUN and WPN CONTR switch set to gunner turret does not go to stow position and remain steady.	Perform TSU CONTROL OF TURRET TEST.	Para 3-19
13. Turret does not aline with TSU LOS WITH ACQ/TRK/STOW switch in TRK and LHG action switch depressed.	Perform TSU CONTROL OF TURRET TEST.	Para 3-19
14. Turret tracks TSU LOS below approximately −5° EL when DEPR LIMIT switch is on.	Perform DEPRESSION LIMIT TEST.	Para 3-21
15. Turret does not track TSU LOS at high rate when TUR SLEW switch is set to NORM.	Perform TSU CONTROL OF TURRET TEST.	Para 3-19
16. Turret tracks TSU LOS into limits and keeps driving.	Perform PROXIMITY SWITCH TEST.	Para 3-20
17. M197 gun rotates when turret is in a limit.	Perform PROXIMITY SWITCH TEST.	Para 3-20
18. M197 gun does not rotate when turret is alined with TSU LOS and LHG action and trigger switches are depressed.	Perform GUN FUNCTION TEST.	Para 3-26

Fault Symptom	Action	Reference
ACQUISITION		
19. TSU does not track GHS with ACQ/TRK/STOW switch held to ACQ.	Perform ACQUISITION TEST.	Para 3-24
20. TSU does not track PHS with PHS/NORM/ALT switch held to PHS.	Perform ACQUISITION TEST.	Para 3-24
EMERGENCY STOW		
21. Turret emergency stow fails.	Perform EMERGENCY STOW TEST.	Para 3-30
SCAS FAULTS		
22. SCAS fails.	Perform SCAS TEST.	Para 3-28
TSU RANGE COMPENSATION		
23. Turret position does not change in response to RANGE switch.	Perform TSU RANGE COMPENSATION TEST.	Para 3-27
COINCIDENCE		
24. Turret does not drive to aline with any sight system LOS.	Perform COINCIDENCE TEST.	Para 3-29
M89E1 FEEDER		
25. M89E1 feeder will not feed (M197 gun is free to rotate).	**NOTE** **After each feeder jam, perform CHECKOUT OF M89E1 FEEDER, para 3-43.**	
	1. Check to see if W2P1 is connected to W3J1 at aft end of saddle.	
	2. Check to see if solenoid is engaging, see GUN FUNCTION TEST.	Para 3-26
	3. Check for link separation and damaged links, see LOADING AMMUNITION.	Para 2-11
	4. Check for missing feeder mounting pin, see REMOVAL/INSTALLATION OF M89E1 FEEDER.	Para 3-41

M89E1 FEEDER (cont)

Fault Symptom	Action	Reference
25. M89E1 feeder will not feed (M197 gun is free to rotate) (cont).	5. Check for loose solenoid mounting bolts, see REPAIR OF M89E1 FEEDER.	Para 3-42
	6. Check for mistimed (improperly assembled) parts of M89E1 feeder, see REPAIR OF M89E1 FEEDER.	Para 3-42
	7. Check for loose cap mounting bolts, see REPAIR OF M89E1 FEEDER.	Para 3-42
	8. Check for missing solenoid-to-arm connecting pin, see REPAIR OF M89E1 FEEDER.	Para 3-42
	9. Check for worn clutch parts, see REPAIR OF M89E1 FEEDER.	Para 3-42
	10. Check for missing drive wedge alinement pin, see REPAIR OF M89E1 FEEDER.	Para 3-42
	11. Check for missing drive wedge arm pivot bolt, see REPAIR OF M89E1 FEEDER.	Para 3-42
	12. Check for broken gear teeth, see REPAIR OF M89E1 FEEDER.	Para 3-42
	13. Inspect for dirt behind plunger in solenoid, see REPAIR OF M89E1 FEEDER.	Para 3-42
26. M89E1 feeder will not feed (M197 gun is not free to rotate).	**NOTE** **After each feeder jam, perform CHECKOUT OF M89E1 FEEDER, para 3-43.**	
	1. Check for jammed M197 gun and perform SAFING INSPECTION	Para 2-4
	WARNING **Observe all precautions governing care and handling of live ammunition.**	
	2. Check for round jammed in M89E1 feeder caused by link not engaging in stripper. Check for damaged stripper, see REPAIR OF M89E1 FEEDER.	Para 3-42

M89E1 FEEDER (cont)

Fault Symptom	Action	Reference
26 M89E1 feeder will not feed (M197 gun is not free to rotate) (cont).	3. Check for jammed M89E1 feeder caused by sprockets puncturing a round. Check for damaged sprockets, see REPAIR OF M89E1 FEEDER.	Para 3-42
	4. Check for link stuck in T-bar guide. Check T-bar guide and stripper for damage, see REPAIR OF M89E1 FEEDER.	Para 3-42
	5. Check for feeder to gun timing, see REMOVAL/INSTALLATION OF M89E1 FEEDER.	Para 3-41
	6. Check for dirt in clutch mechanism, see REPAIR OF M89E1 FEEDER.	Para 3-42
	7. Check for defective bearings, see REPAIR OF M89E1 FEEDER.	Para 3-42
	8. Check for mistimed improperly assembled parts of M89E1 feeder, see REPAIR OF M89E1 FEEDER.	Para 3-42
27. M89E1 feeder will not declutch.	1. Check if power is continuously applied to solenoid. Feeder solenoid should engage and disengage in response to triggers, see TURRET SUBSYSTEM PRE-OPERATIONAL CHECK.	Para 2-8
	2. Check for foreign matter between wedge and feeder housing, see REPAIR OF M89E1 FEEDER.	Para 3-42
	3. Check for dirty clutch parts, see REPAIR OF M89E1 FEEDER.	Para 3-42
	4. Check for broken or missing spring behind plunger in solenoid, see REPAIR OF M89E1 FEEDER.	Para 3-42
	5. Check for foreign matter between cap and gear, see REPAIR OF M89E1 FEEDER.	Para 3-42
	6. Check for foreign matter between pin and wedge, see REPAIR OF M89E1 FEEDER.	Para 3-42
28. M89E1 feeder feeds erratically.	1. Check for dirty or bent connector pins at connection of W2P2, see REMOVAL/INSTALLATION OF M89E1 FEEDER.	Para 3-41

M89E1 FEEDER (cont)

Fault Symptom	Action	Reference
28. M89E1 feeder feeds erratically (cont).	2. Check to see if power is applied intermittently to solenoid. Power should be applied continuously when trigger is applied. see TURRET SUBSYSTEM PRE-OPERATIONAL CHECK.	Para 2-8
	3. Check solenoid for proper operation. see GUN FUNCTION TEST.	Para 3-26
	4. Check for loose solenoid mounting bolts. see REPAIR OF M89E1 FEEDER.	Para 3-42
M197 GUN		
29. M197 gun does not fire.	1. Perform GUN FUNCTION TEST.	Para 3-26
	2. Check for worn or damaged contact cam. see REPAIR OF FIRING CONTACT.	Para 3-48
30. Firing circuit shorted.	1. Check breech bolts for short circuit. see REPAIR OF BREECH BOLT (11691422) or REPAIR OF BREECH BOLT (11010157).	Para 3-49 or 3-50
	2. Check firing contact for short circuit. see REPAIR OF FIRING CONTACT.	Para 3-48
31. Firing circuit open.	1. Check breech bolts for open circuit. see REPAIR OF BREECH BOLT (11691422) or REPAIR OF BREECH BOLT (11010157).	Para 3-49 or 3-50
	2. Check firing contact for open circuit. see REPAIR OF FIRING CONTACT.	Para 3-48
32. High rotating torque — in excess of 100 lb-in. (11.3 N.m).	1. Check for lack of lubrication.	Para 3-0
	2. Check for defective breech bolts. see REPAIR OF BREECH BOLT (11691422) or REPAIR OF BREECH BOLT (11010157).	Para 3-49 or 3-50
	3. Check for defective unlocking and locking cams. see REPAIR OF M197 GUN.	Para 3-46

M197 GUN (cont)

Fault Symptom	Action	Reference
32. High rotating torque — in excess of 100 lb-in. (11.3 N.m) (cont).	4. Inform next higher maintenance level to check for defective ball bearing or needle bearing.	
	5. Check for defective rotor tracks, see REPAIR OF M197 GUN.	Para 3-46
	6. Check for damaged main cam path in gun housing, see REPAIR OF M197 GUN.	Para 3-46
33. M197 gun will not turn.	1. Check for improperly installed breech bolts, see REPAIR OF M197 GUN.	Para 3-46
	2. Check for improperly assembled breech bolts, see REPAIR OF BREECH BOLT (11691422) or REPAIR OF BREECH BOLT (11010157).	Para 3-49 or 3-50
	3. Check for improperly installed tracks, see REPAIR OF M197 GUN.	Para 3-46
	4. Check for foreign matter in rotor housing, see REPAIR OF M197 GUN.	Para 3-46
	5. Check that cam lock bolts are not below working surface of cam, see REPAIR OF M197 GUN.	Para 3-46
	6. Check for missing or incorrectly installed laminated shim, see REPAIR OF M197 GUN.	Para 3-46
	7. Check for warped rotor housing, see REPAIR OF M197 GUN.	Para 3-46
34. M197 gun fires slowly or erratically.	1. Check for lack of or improperly lubricated gun.	Para 3-0
	2. Check for bent or damaged guide bar, see REPAIR OF M197 GUN.	Para 3-46
	3. Inform next higher maintenance level to check for defective ball bearing or needle bearing.	
	4. Check gun torque, see REPAIR OF M197 GUN.	Para 3-46
	5. Replace gun drive, see REMOVAL/INSTALLATION OF GUN DRIVE.	Para 3-53
	6. Check for damaged rotor housing, see REPAIR OF M197 GUN.	Para 3-46

M197 GUN (cont)

Fault Symptom	Action	Reference
34. M197 gun fires slowly or erratically (cont).	7. Check laminated shim for proper thickness, see REPAIR OF M197 GUN.	Para 3-46
	8. Check for teflon buildup on firing voltage contacts, see REPAIR OF FIRING CONTACT.	Para 3-48
35. Hangfires or misfires.	1. Check breech bolts, see REPAIR OF BREECH BOLT (11691422) or REPAIR OF BREECH BOLT (11010157).	Para 3-49 or 3-50
	2. Check for defective ammunition.	
36. Round firing out of lock.	1. Check firing contact, see REPAIR OF FIRING CONTACT.	Para 3-48
	2. Check breech bolts, see REPAIR OF BREECH BOLT(11691422) or REPAIR OF BREECH BOLT (11010157).	Para 3-49 or 3-50
	3. Check for missing or damaged cam lock, see REPAIR OF M197 GUN.	Para 3-46
37. Spent cases are not extracted.	1. Check breech bolts for damaged extractor lip, see REPAIR OF BREECH BOLT (11691422) or REPAIR OF BREECH BOLT (11010157).	Para 3-49 or 3-50
	2. Check for cartridge case(s) which has separated and lodged in chamber, see REPAIR OF M197 GUN.	Para 3-46
	3. Check for dirty or oily chambers in barrels, see REPAIR OF M197 GUN.	Para 3-46
38. Spent cases are not ejected.	Check for damaged guide bar, see REPAIR OF M197 GUN.	Para 3-46
39. Erratic dispersion pattern.	1. Check for loose muzzle clamp bolt, see REMOVAL/INSTALLATION OF M197 GUN BARRELS.	Para 3-44
	2. Check for worn barrels, see BORE EROSION CHECK in PMCS.	Para 3-7

M197 GUN (cont)

Fault Symptom	Action	Reference
39. Erratic dispersion pattern (cont).	3. Notify next higher maintenance level to check preload of recoil adapter. 4. Notify next higher maintenance level to check for worn or damaged slider.	
40. Apparent excessive gun vibration.	1. Notify next higher maintenance level to check for worn or damaged rear mount on saddle. 2. Check for loose or damaged end plate, see REPAIR OF M197 GUN.	 Para 3-46
TURRET		
41. Turret chatters in elevation.	Notify next higher maintenance level to check for sticking/dragging elevation drive motor brake.	
42. Turret chatters in azimuth.	Notify next higher maintenance level to check for sticking/dragging azimuth drive motor brake.	
43. Turret binds in azimuth.	1. Notify next higher maintenance level to check for sticking/dragging azimuth drive motor brake. 2. Notify next higher maintenance level to check for dirty or defective main bearing.	
44. Turret fails to drive up in elevation.	1. Notify next higher maintenance level to check for defective elevation drive motor. 2. Notify next higher maintenance level to check for defective elevation drive clutch.	
45. Erratic dispersion.	1. Notify next higher maintenance level to check for loose, worn, or defective ball mount. 2. Notify next higher maintenance level to check for loose rear support.	

TURRET (cont)

Fault Symptom	Action	Reference
45. Erratic dispersion (cont).	3. Notify next higher maintenance level to check for loose mounting of saddle in turret.	
46. Turret can be moved with azimuth and elevation brakes applied.	1. Notify next higher maintenance level to check azimuth and elevation drive motor brakes. 2. Notify next higher maintenance level to check azimuth and elevation drive clutches.	
47. Unable to retain boresight.	Check for loose muzzle clamp, see REMOVAL/INSTALLATION OF M197 GUN BARRELS.	Para 3-44
48. Ammunition belt separation.	1. Check for defective feed chute, see REPAIR OF FEED CHUTE.	Para 3-63
	2. Check for properly loaded ammunition box, see LOADING AMMUNITION.	Para 2-11
	3. Check booster motor operation, see TURRET SUBSYSTEM PRE-OPERATIONAL CHECK.	Para 2-8
	4. Check for binding in bellmouth, see REPAIR OF COVER ASSEMBLY.	Para 3-61
49. Excessive aircraft vibration during gun firing.	Check recoil adapter and slider, see REPAIR OF RECOIL ADAPTER AND SLIDER.	Para 3-55 and Para 3-55.1
50. Turret does not slew to agree with sight system LOS.	Perform CHECKOUT OF TURRET BUFFER AMPLIFIER.	Para 3-40.2

3-17. TEST SET CABLE CONNECTIONS

DESCRIPTION

This task covers: Test set cable W1, W2, W3, W4, W5, W6, W8, W9, W10, W14, W15, W21, W20, W22, W23, W24, W25, and test set interface assembly connections.

INITIAL SETUP

Tools/Test and Support Equipment:
Tool Set, A/C Armament Repairman: Basic
Tool Set, A/C Armament Repairman: Supplemental
Electronics Systems Test Set: M137

References:
TM 55-1520-236-23

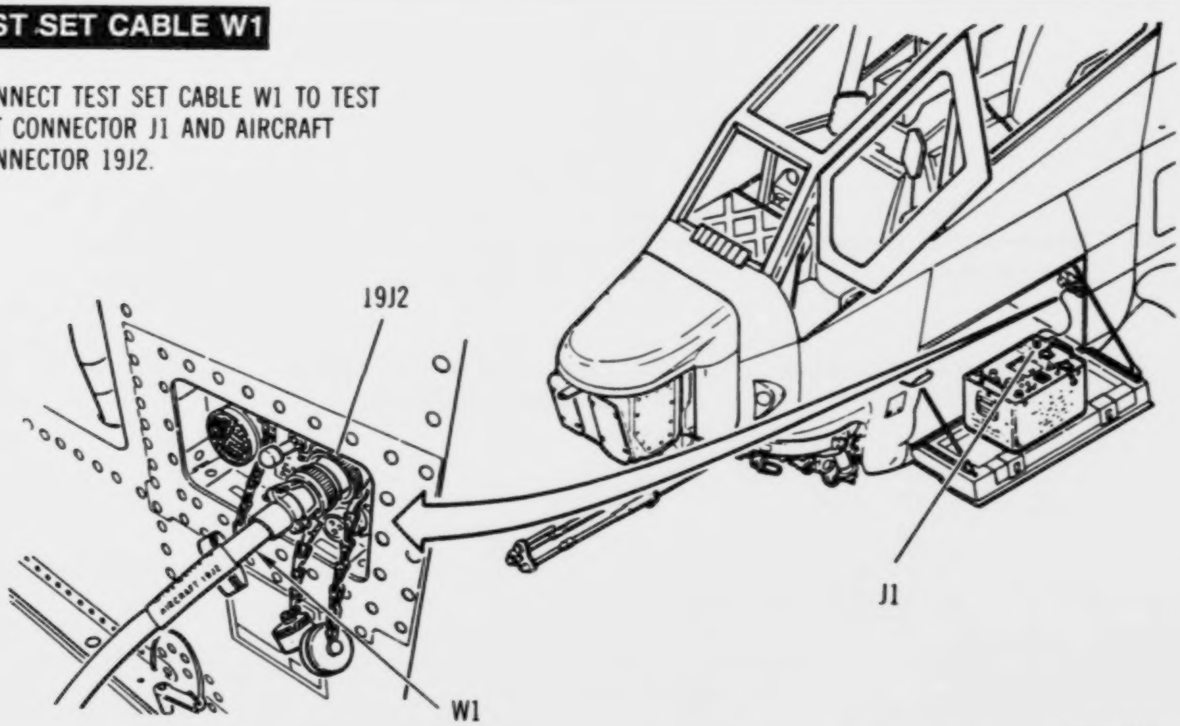
Personnel Required:
68J Aircraft Fire Control Repairer (1)

Equipment Conditions:
HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP performed, para 2-6.

General Safety Instructions:
Make sure no power is applied to helicopter when making or breaking connections.

TEST SET CABLE W1

CONNECT TEST SET CABLE W1 TO TEST SET CONNECTOR J1 AND AIRCRAFT CONNECTOR 19J2.

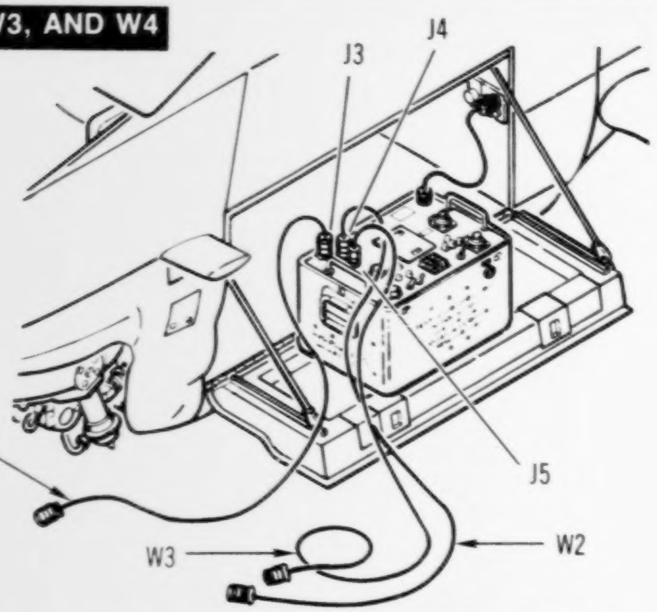


ARR87-26683

TEST SET EXTENDER CABLES W2, W3, AND W4

CONNECT TEST SET EXTENDER CABLES AS FOLLOWS:

W2P1 to test set J4
W3P1 to test set J5
W4P1 to test set J3

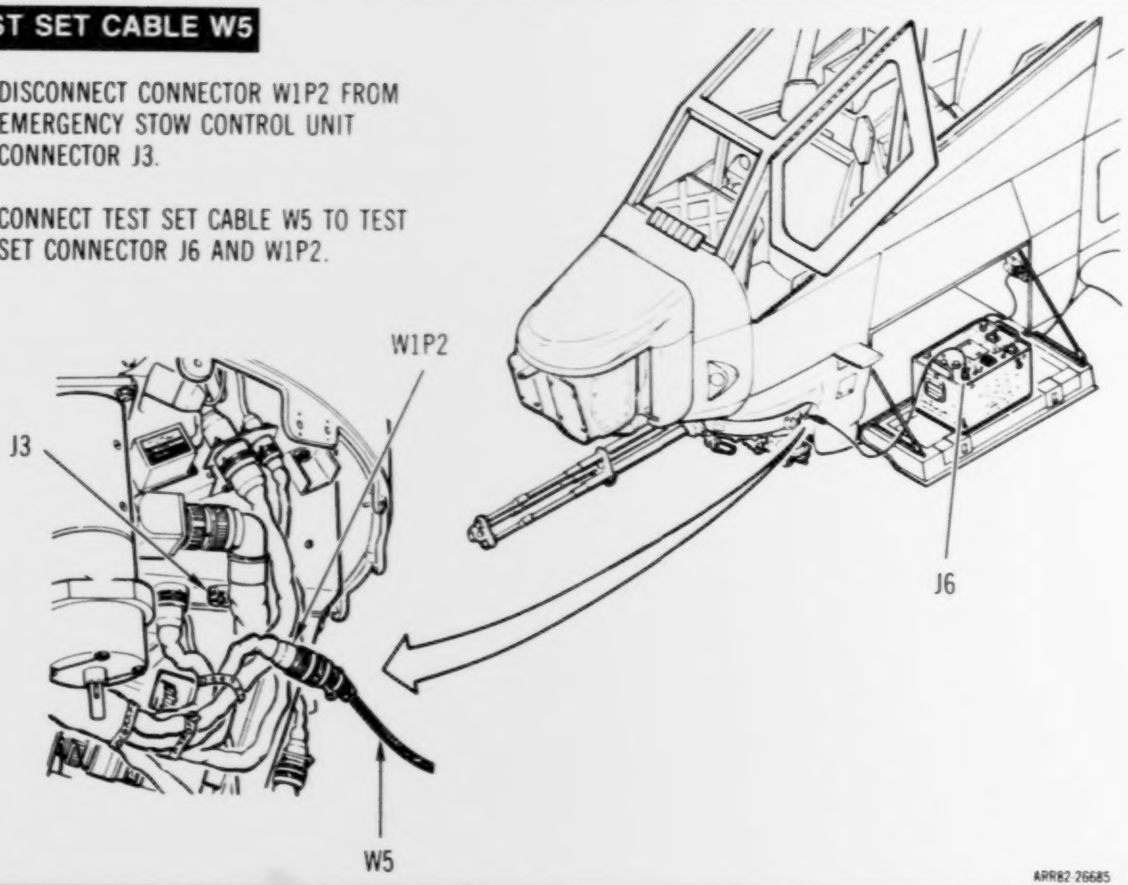


ARR82-26684

TEST SET CABLE W5

1. DISCONNECT CONNECTOR W1P2 FROM EMERGENCY STOW CONTROL UNIT CONNECTOR J3.

2. CONNECT TEST SET CABLE W5 TO TEST SET CONNECTOR J6 AND W1P2.

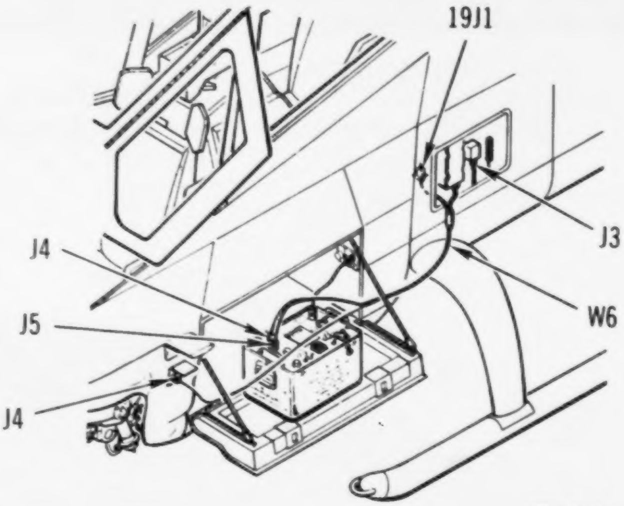


ARR82-26685

3-17. TEST SET CABLE CONNECTIONS (cont)

TEST SET CABLE W6

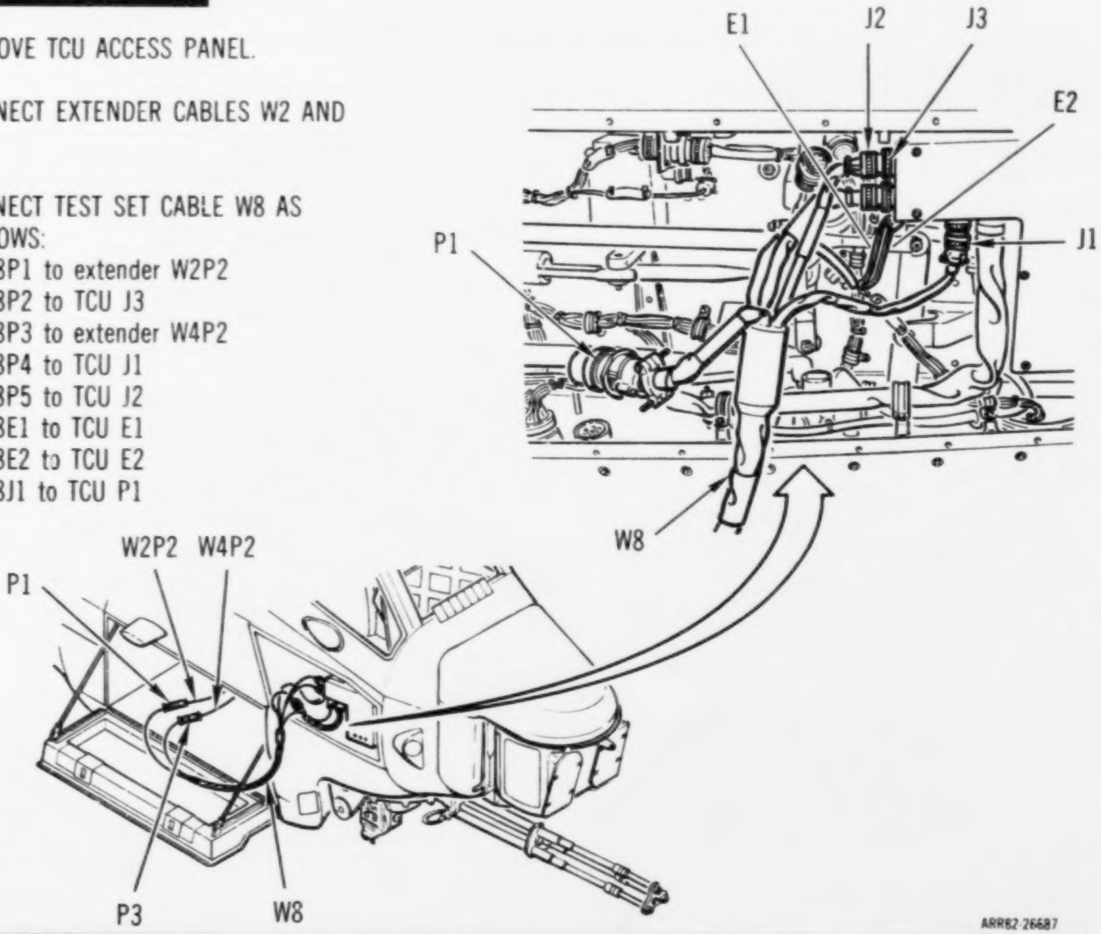
1. REMOVE LOGIC CONTROL UNIT ACCESS PANEL.
2. CONNECT TEST SET CABLE W6 AS FOLLOWS:
   W6P1 to test set J4
   W6P2 to test set J5
   W6P3 to GCU J4
   W6P4 to LCU J3
   W6P5 to 19J1



ARR82-26686

TEST SET CABLE W8

1. REMOVE TCU ACCESS PANEL.
2. CONNECT EXTENDER CABLES W2 AND W4.
3. CONNECT TEST SET CABLE W8 AS FOLLOWS:
   W8P1 to extender W2P2
   W8P2 to TCU J3
   W8P3 to extender W4P2
   W8P4 to TCU J1
   W8P5 to TCU J2
   W8E1 to TCU E1
   W8E2 to TCU E2
   W8J1 to TCU P1

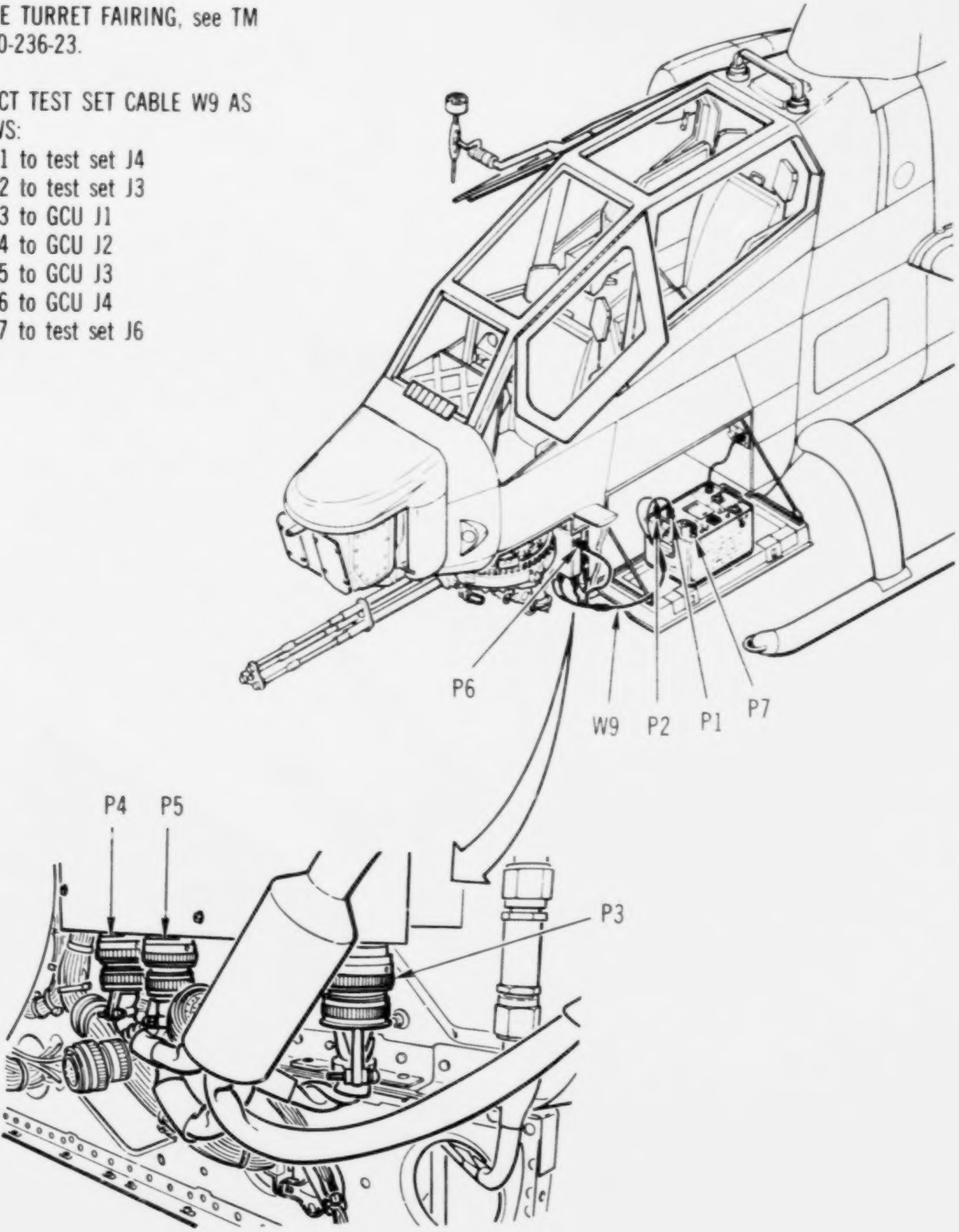


ARR82-26687

TEST SET CABLE W9

1. REMOVE TURRET FAIRING, see TM 55-1520-236-23.

2. CONNECT TEST SET CABLE W9 AS FOLLOWS:
   - W9P1 to test set J4
   - W9P2 to test set J3
   - W9P3 to GCU J1
   - W9P4 to GCU J2
   - W9P5 to GCU J3
   - W9P6 to GCU J4
   - W9P7 to test set J6



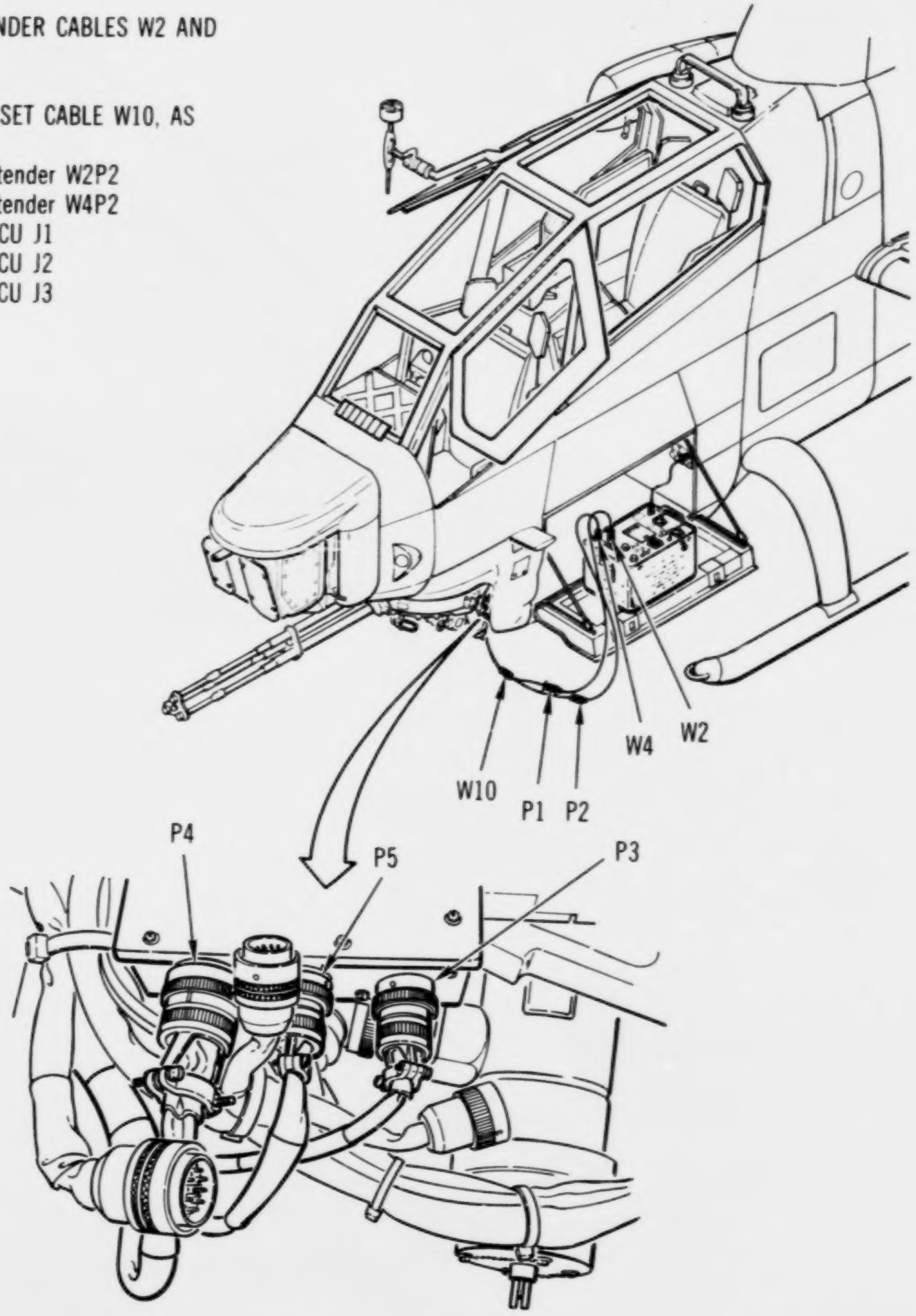
ARR82-26688

3-17. TEST SET CABLE CONNECTIONS (cont)

TEST SET CABLE W10

1. CONNECT EXTENDER CABLES W2 AND W4.

2. CONNECT TEST SET CABLE W10, AS FOLLOWS:
   - W10P1 to extender W2P2
   - W10P2 to extender W4P2
   - W10P3 to ESCU J1
   - W10P4 to ESCU J2
   - W10P5 to ESCU J3

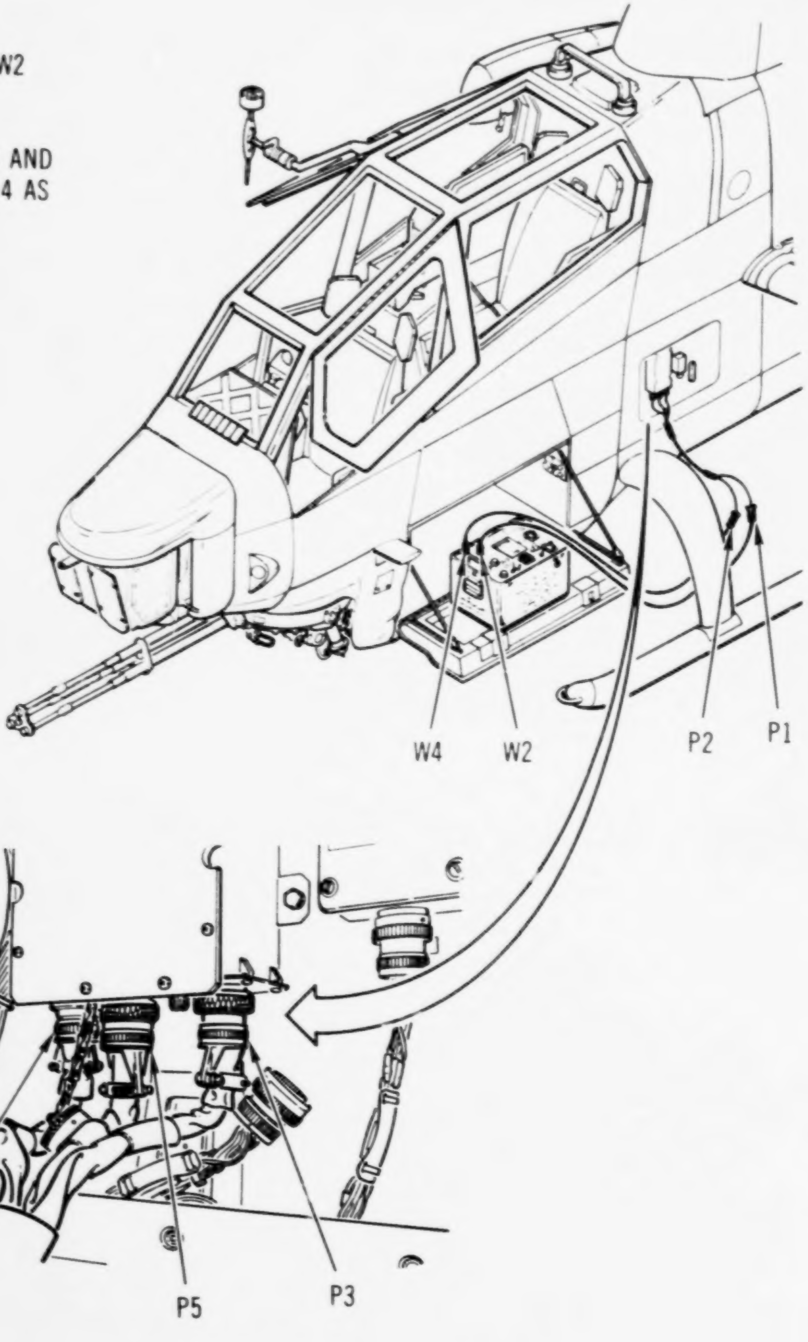

W4
W2
W10
P1
P2
P4
P5
P3
VIEW/LOOKING-UP
ARR82-26689

TEST SET CABLE W14

1. REMOVE ACCESS PANEL.

2. CONNECT EXTENDER CABLES W2 AND W4.

3. REMOVE COVER FROM LCU J3 AND CONNECT TEST SET CABLE W14 AS FOLLOWS:
   W14P1 to extender W2P2
   W14P2 to extender W4P2
   W14P3 to LCU J1
   W14P4 to LCU J2
   W14P5 to LCU J3

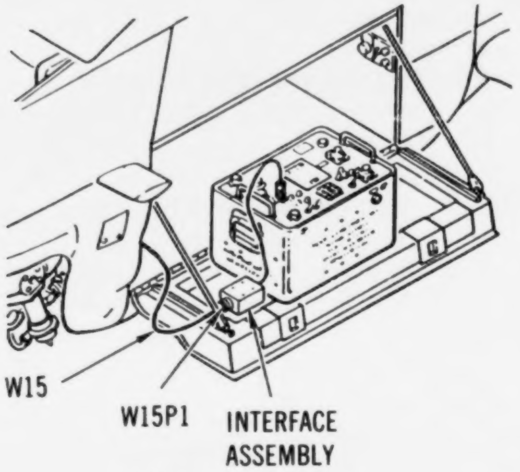


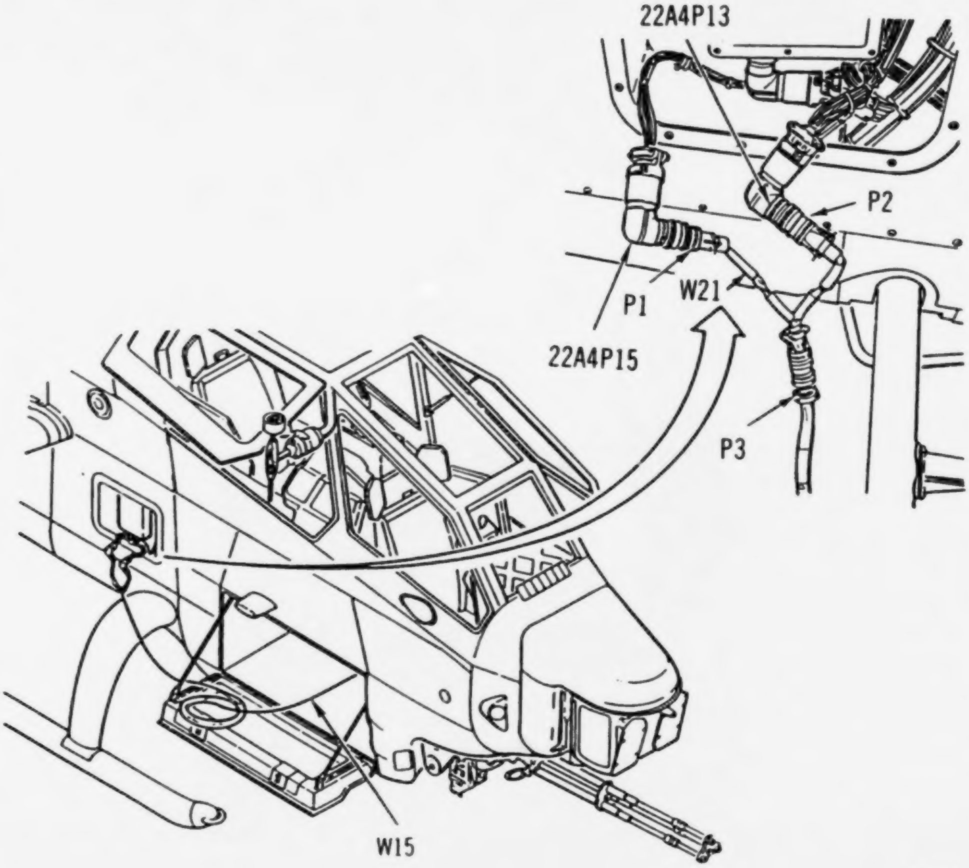
ARR82 26690

3-17. TEST SET CABLE CONNECTIONS (cont)

TEST SET CABLE W15 AND W21

1. CONNECT INTERFACE ASSEMBLY CONNECTOR P1 TO TEST SET CONNECTOR J2.
2. CONNECT TEST CABLE W15P1 TO INTERFACE ASSEMBLY CONNECTOR J1.
3. REMOVE IFCU ACCESS PANEL.
4. CONNECT TEST SET CABLE W21 AS FOLLOWS:
   W21P1 to cable W15P2
   W21P2 to acft 22A4P13
   W21P3 to acft 22A4P15

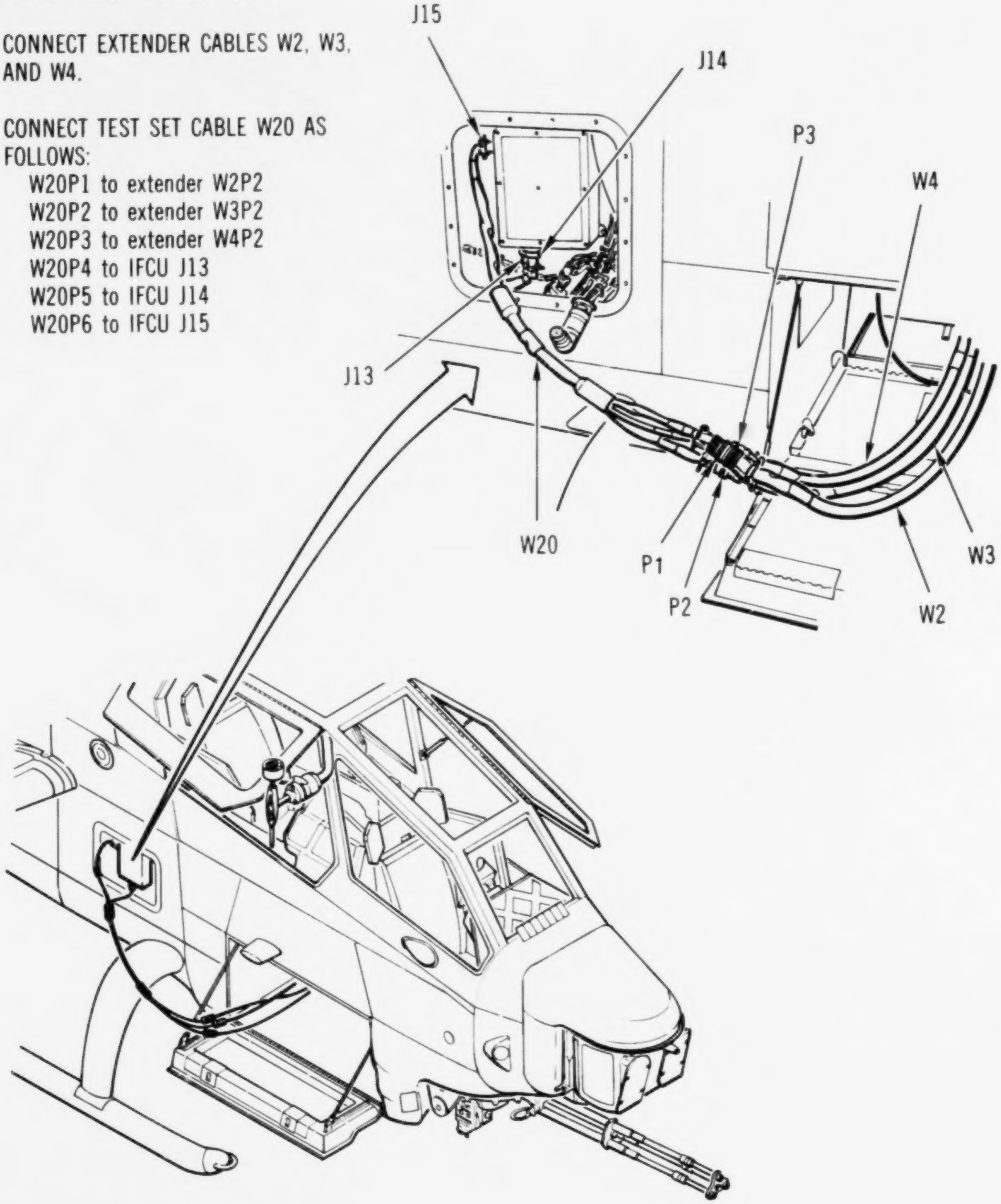

W15
W15P1
INTERFACE ASSEMBLY


22A4P13
P2
P1
W21
22A4P15
P3
W15

ARR87-26692

TEST SET CABLE W20

1. REMOVE IFCU ACCESS PANEL.
2. CONNECT EXTENDER CABLES W2, W3, AND W4.
3. CONNECT TEST SET CABLE W20 AS FOLLOWS:
    - W20P1 to extender W2P2
    - W20P2 to extender W3P2
    - W20P3 to extender W4P2
    - W20P4 to IFCU J13
    - W20P5 to IFCU J14
    - W20P6 to IFCU J15

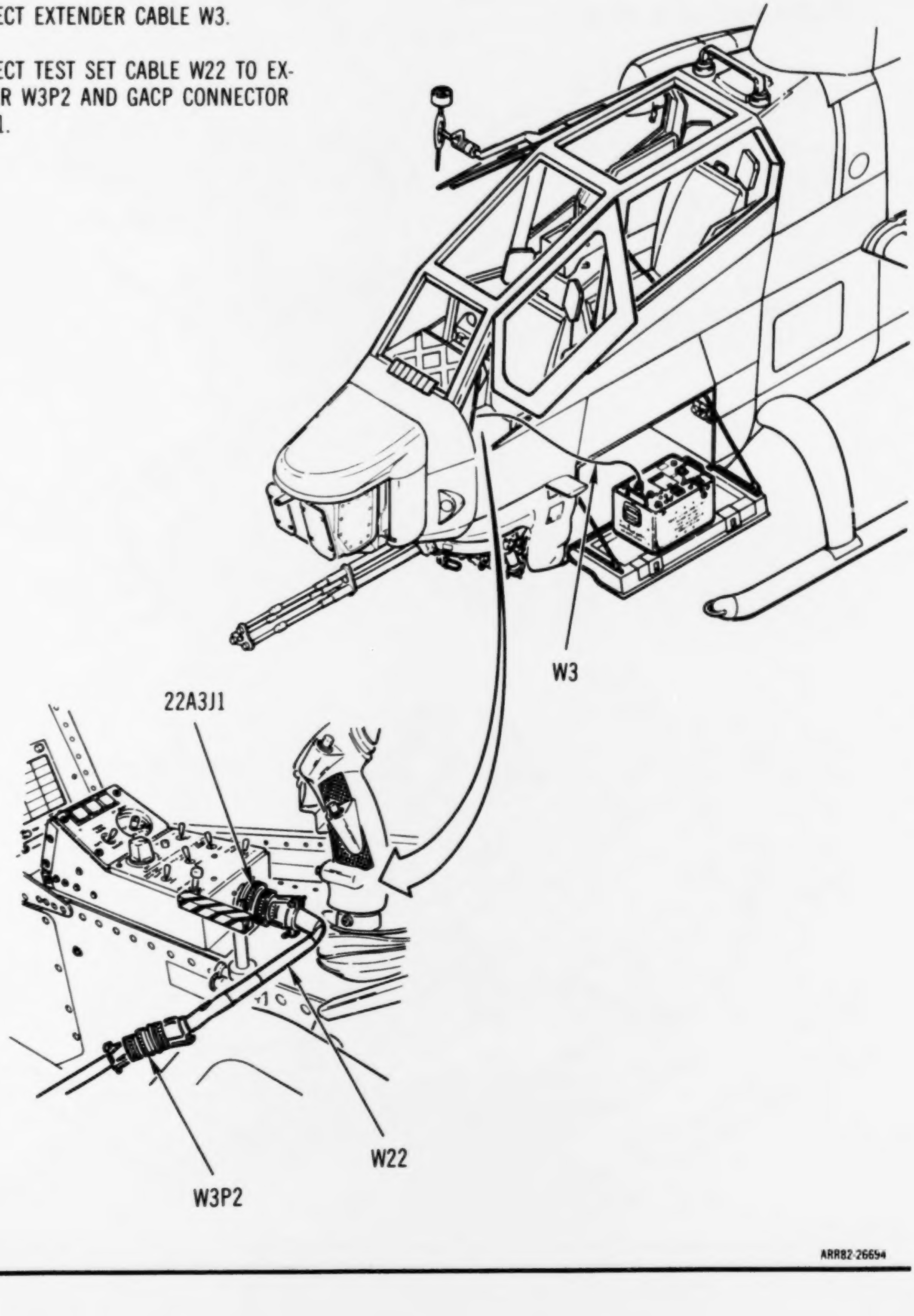


ARR82-26693

3-17. TEST SET CABLE CONNECTIONS (cont)

TEST SET CABLE W22

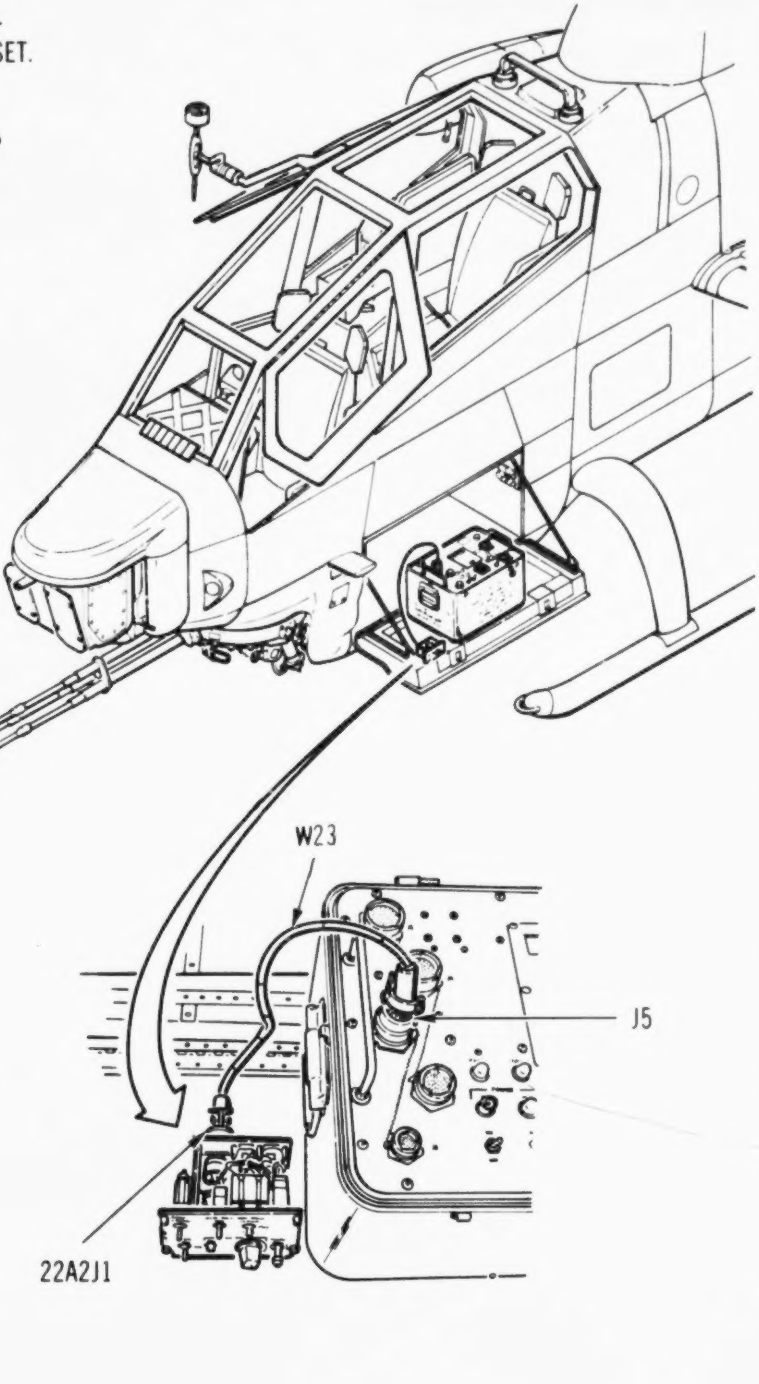
1. CONNECT EXTENDER CABLE W3.
2. CONNECT TEST SET CABLE W22 TO EXTENDER W3P2 AND GACP CONNECTOR 22A3J1.



ARR82-26694

TEST SET CABLE W23

1. REMOVE PACP AND PLACE ON NON-CONDUCTING SURFACE NEAR TEST SET.
2. CONNECT TEST SET CABLE W23 TO TEST SET CONNECTOR J5 AND PACP CONNECTOR 22A2J1.



ARR82 26695

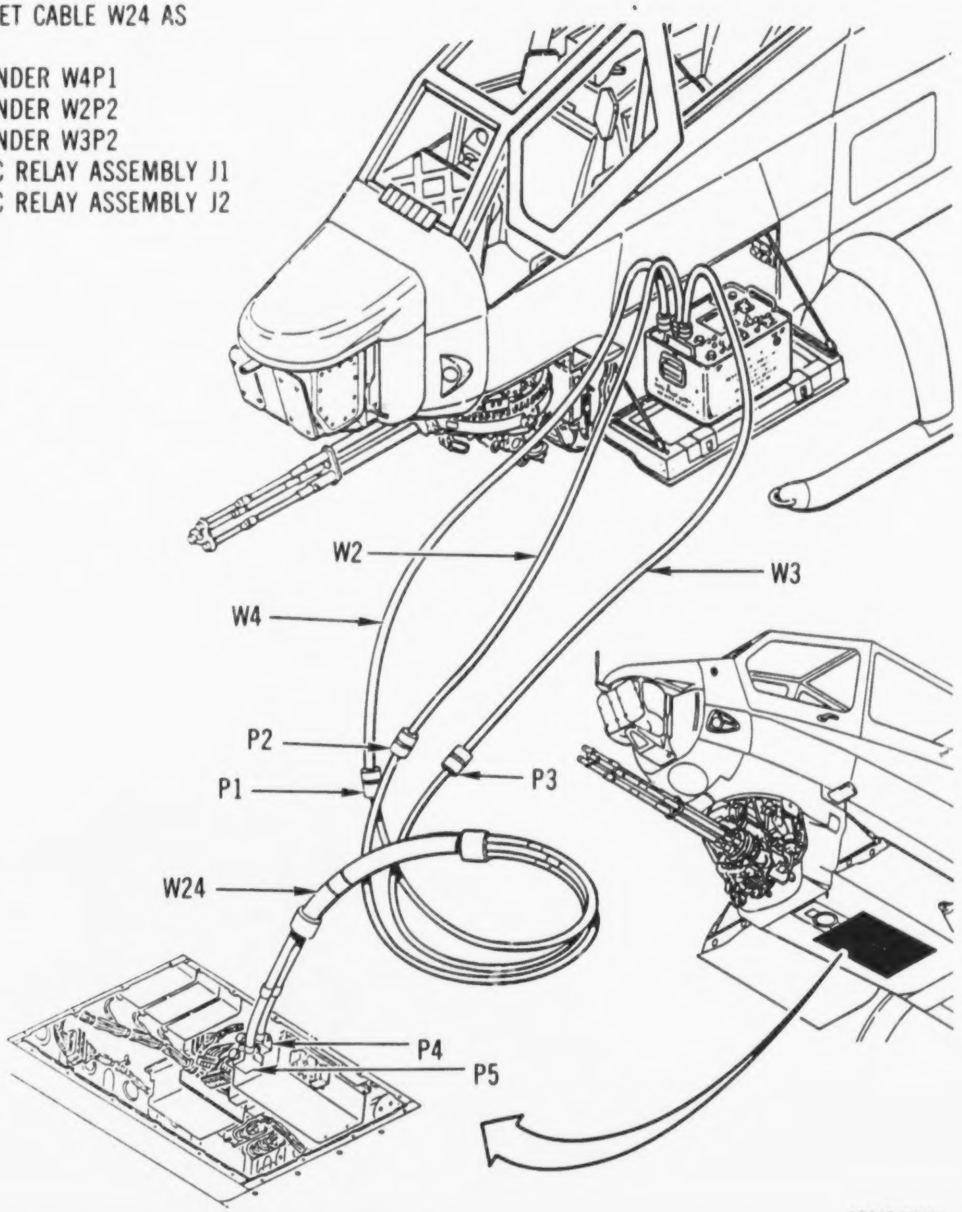
3-17. TEST SET CABLE CONNECTIONS (cont)

TEST SET CABLE W24

1. REMOVE BOTTOM ACCESS PANEL, SEE TM 55-1520-236-23.

2. CONNECT TEST SET EXTENDER CABLES **W2, W3, AND W4.**

3. CONNECT TEST SET CABLE W24 AS FOLLOWS:
   W24P1 to EXTENDER W4P1
   W24P2 to EXTENDER W2P2
   W24P3 to EXTENDER W3P2
   W24P4 to LOGIC RELAY ASSEMBLY J1
   W24P4 to LOGIC RELAY ASSEMBLY J2



ARR87-26798A

TEST SET CABLE W25

1. REMOVE TURRET FAIRING.

NOTE

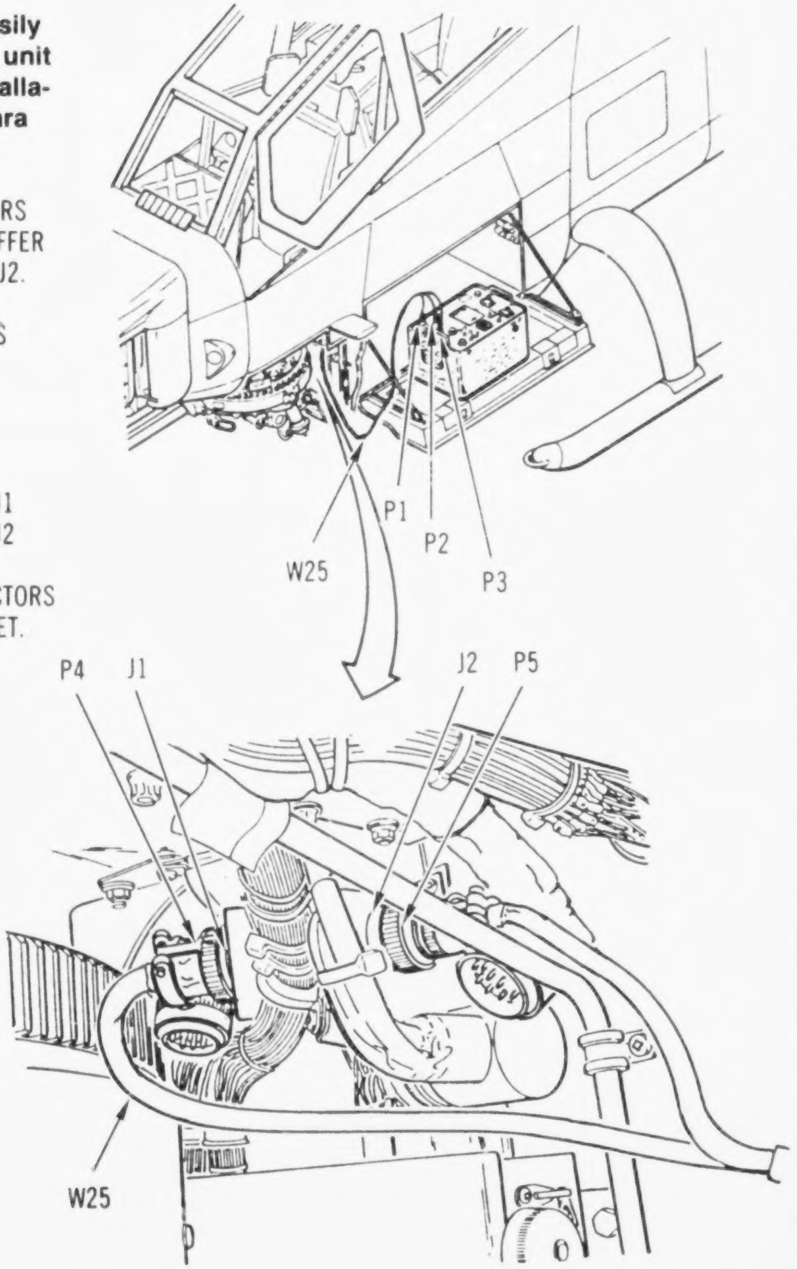
Buffer amplifier is more easily accessed with gun control unit removed. See removal/installation of gun control unit, para 3-66.

2. DISCONNECT AIRCRAFT CONNECTORS 19A7P1 AND 19A7P247 FROM BUFFER AMPLIFIER CONNECTORS J1 AND J2.

3. CONNECT TEST SET CABLE W25 AS FOLLOWS:

   W25P1 to TEST SET J3
   W25P2 to TEST SET J4
   W25P3 to TEST SET J5
   W25P4 to BUFFER AMPLIFIER J1
   W25P5 to BUFFER AMPLIFIER J2

4. MAKE SURE CABLES AND CONNECTORS ARE POSITIONED CLEAR OF TURRET.



ARR87-28216

END OF TASK

3-18. SIGHT BYPASS PROCEDURE

DESCRIPTION

This task covers: Connection and operation of the test set sight simulator to be used whenever the TSU and/or HSS are non-functional or the interface control unit has been removed from the helicopter and the turret subsystem requires maintenance action.

INITIAL SETUP

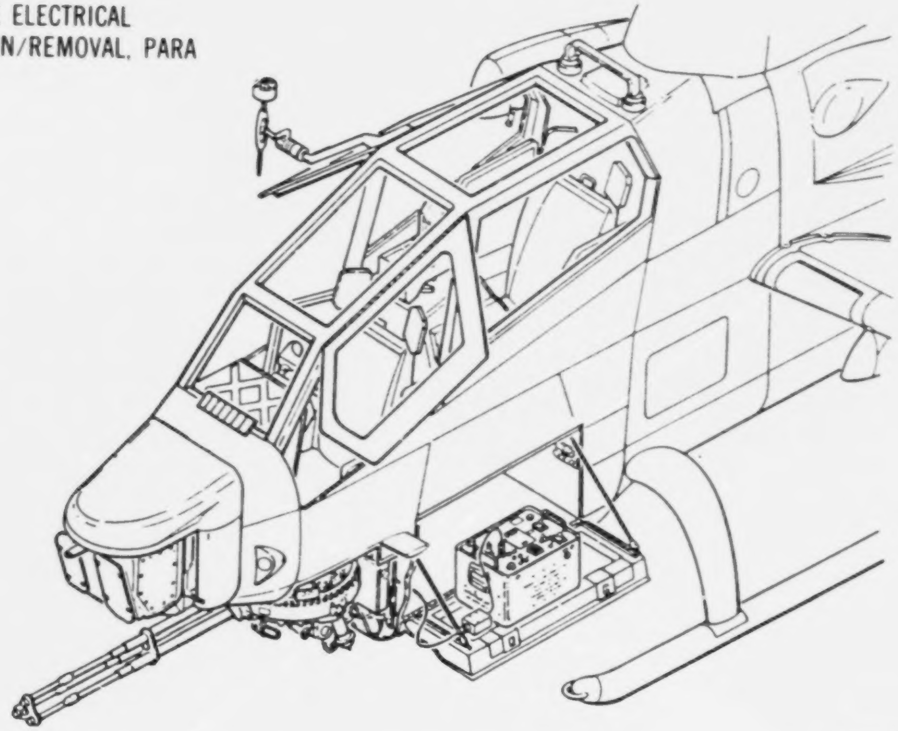
Tools/Test and Support Equipment:
- Tool Set, A/C Armament Repairman: Basic
- Tool Set, A/C Armament Repairman: Supplemental
- Electronics Systems Test Set: M137

Personnel Required:
- 68J Aircraft Fire Control Repairer (2)

Equipment Conditions:
- HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP performed, para 2-6.
- Test set cables W15, W21, and Interface Assembly connected, see TEST SET CABLE CONNECTIONS, para 3-17.

SIGHT BYPASS PROCEDURE

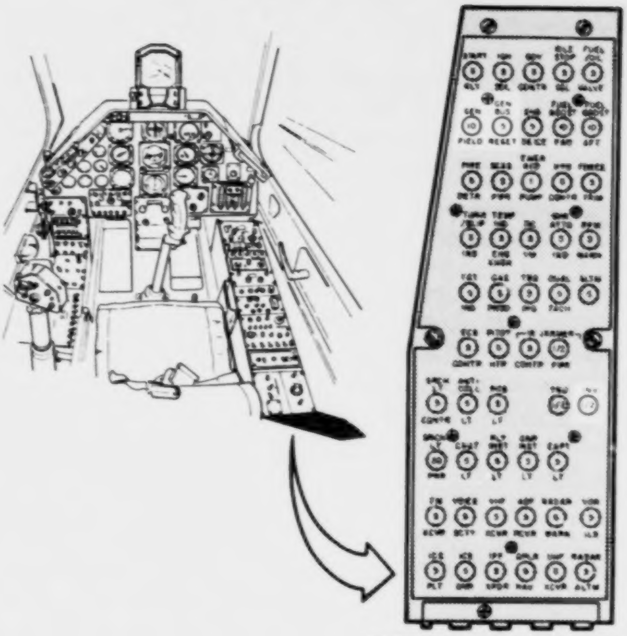
1. APPLY POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.



3-18. SIGHT BYPASS PROCEDURE (cont)

SIGHT BYPASS PROCEDURE (cont)

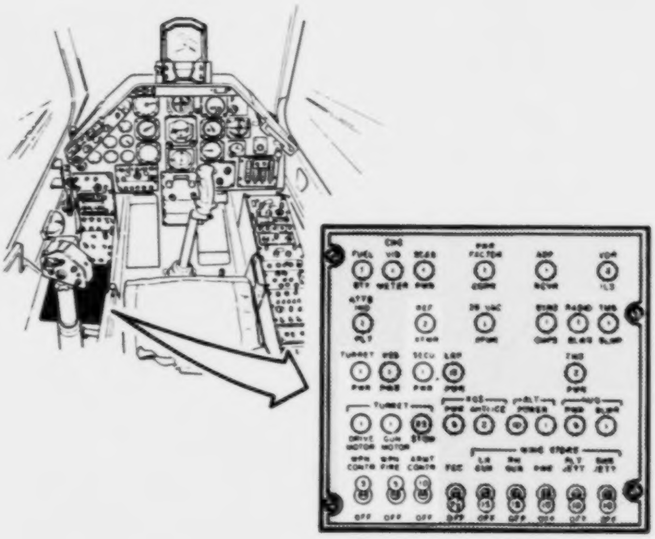
2. CLOSE FOLLOWING CIRCUIT BREAKERS ON DC CIRCUIT BREAKER PANEL:
    - GEN FIELD
    - GEN BUS RESET
    - INV



DC CIRCUIT BREAKER PANEL

ARR82 28020 A

3. CLOSE FOLLOWING CIRCUIT BREAKERS ON AC/ARMAMENT CIRCUIT BREAKER PANEL:
    - REF XFMR
    - TURRET PWR
    - SECU PWR
    - TURRET DRIVE MOTOR
    - TURRET GUN MOTOR
    - WPN CONTR
    - WPN FIRE
    - ARMT CONTR

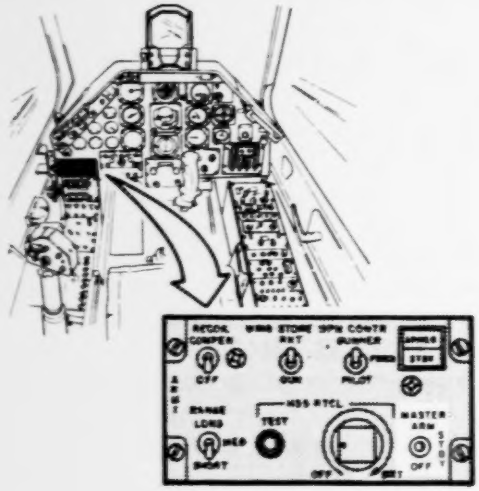


AC / ARMAMENT
CIRCUIT BREAKER PANEL

ARR82 28021

SIGHT BYPASS PROCEDURE (cont)

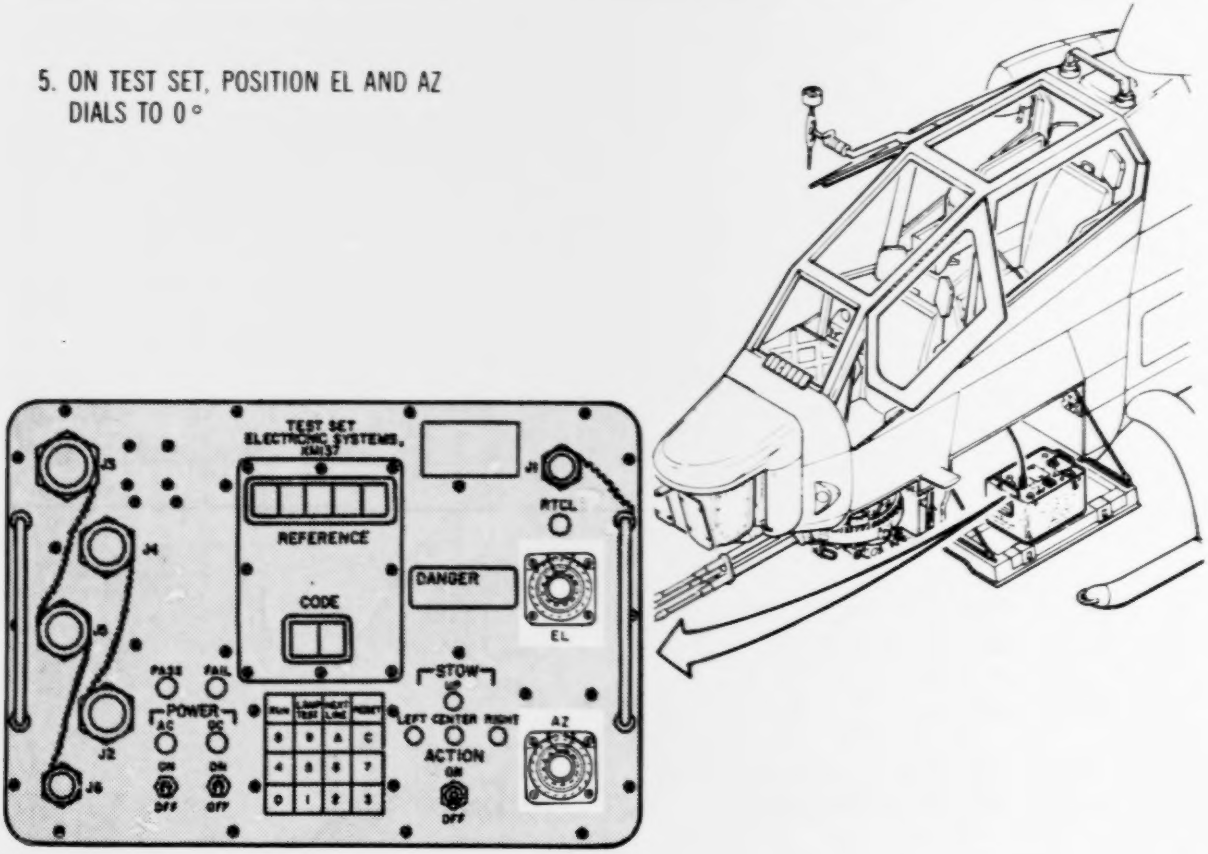
4. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO STBY.


RECOIL COMPEN
OFF
WING STORE
RKT
GUN
SPN CONTR
GUNNER
PILOT
ARMED
STBY
ARMT
RANGE
LONG
MED
SHORT
HSS RTCL
TEST
OFF
BRT
MASTER ARM
STBY
OFF

PILOT ARMAMENT CONTROL PANEL

ARR82 28022

5. ON TEST SET, POSITION EL AND AZ DIALS TO 0°


TEST SET
ELECTRONIC SYSTEMS,
XM137
J3
J4
J5
J2
J6
J1
REFERENCE
CODE
DANGER
RTCL
EL
PASS
FAIL
POWER
AC
DC
ON
OFF
ON
OFF
STOW
UP
LEFT
CENTER
RIGHT
ACTION
ON
OFF
AZ
RUN
LAMP TEST
NEXT LINE
RESET
8
9
A
C
4
5
6
7
0
1
2
3

ARR82-28023

3-18. SIGHT BYPASS PROCEDURE (cont)

SIGHT BYPASS PROCEDURE (cont)

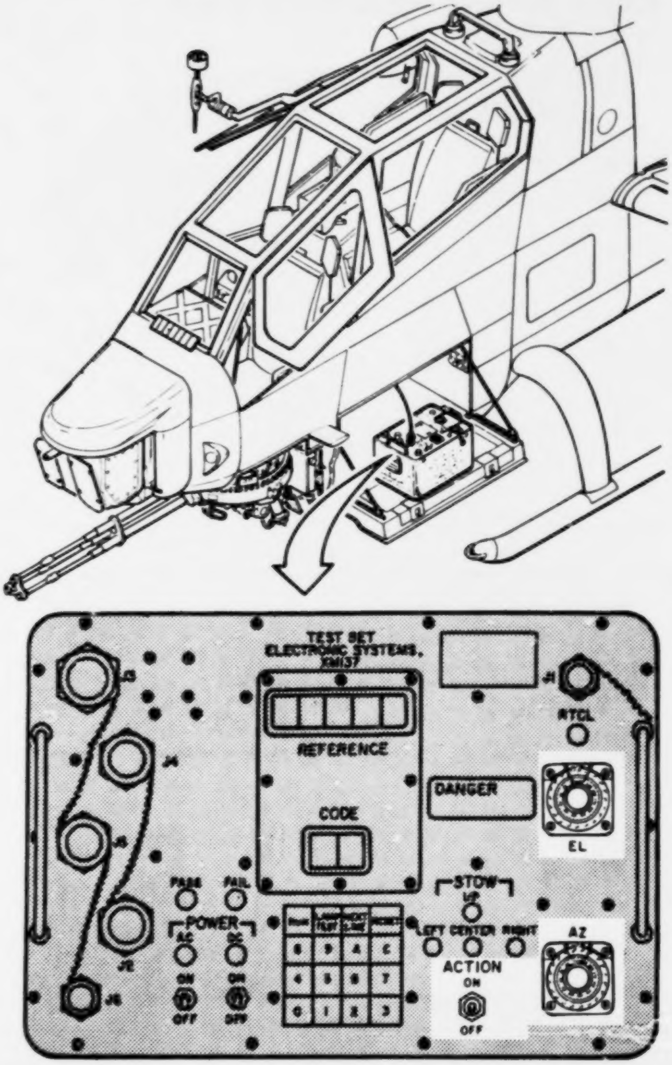
6. ON TEST SET, SET ACTION SWITCH TO ON.

   Turret slews to 0° az 0° el.

NOTE

Clockwise rotation of AZ resolver dial causes the turret to move right. Clockwise rotation of the EL resolver dial causes the turret to move up.

7. VERIFY TEST SET RESOLVER DIALS CONTROL TURRET POSITION.
8. ON TEST SET, SET ACTION SWITCH TO OFF.
9. VERIFY TEST SET RESOLVER DIALS DO NOT CONTROL TURRET WITH ACTION SWITCH OFF.
10. WITH ACTION SWITCH ON, TEST SET WILL NOW POSITION TURRET IN THE SIGHT BYPASS MODE.


TEST SET
ELECTRONIC SYSTEMS,
XM137
REFERENCE
CODE
DANGER
J1
J2
J3
J4
J5
J6
RTCL
EL
AZ
PASS
FAIL
POWER
AC
DC
ON
OFF
ON
OFF
STOW
UP
LEFT
CENTER
RIGHT
ACTION
ON
OFF
4
5
6
7
0
1
2
3

ARR82-28024

11. AFTER COMPLETION OF MAINTENANCE ACTION, REMOVE POWER. SEE ELECTRICAL POWER APPLICATION/ REMOVAL, PARA 2-7.
12. DISCONNECT TEST SET CABLES AND RECONNECT AIRCRAFT CONNECTORS.

END OF TASK

3-19. TSU CONTROL OF TURRET TEST

DESCRIPTION

This test covers: Checkout of TSU control of turret function and fault code data.

INITIAL SETUP

Tools/Test and Support Equipment:
  Tool Set, A/C Armament Repairman: Basic
  Tool Set, A/C Armament Repairman: Supplemental
  Electronics Systems Test Set: M137

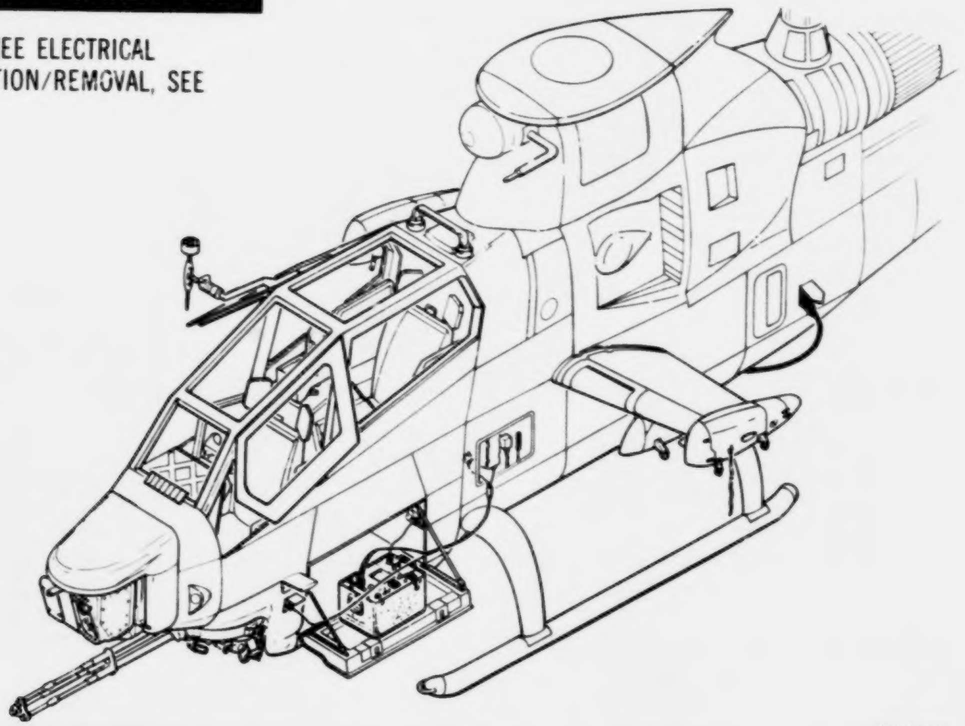
References:
  TM 9-4933-224-13&P
  TM 55-1520-236-23

Personnel Required:
  68J Aircraft Fire Control Repairer (2)

Equipment Conditions:
  HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP performed, para 2-6.
  Test set cables W1 and W6 connected, see TEST SET CABLE CONNECTIONS, para 3-17.
  TSU window cover removed.

TSU CONTROL OF TURRET TEST

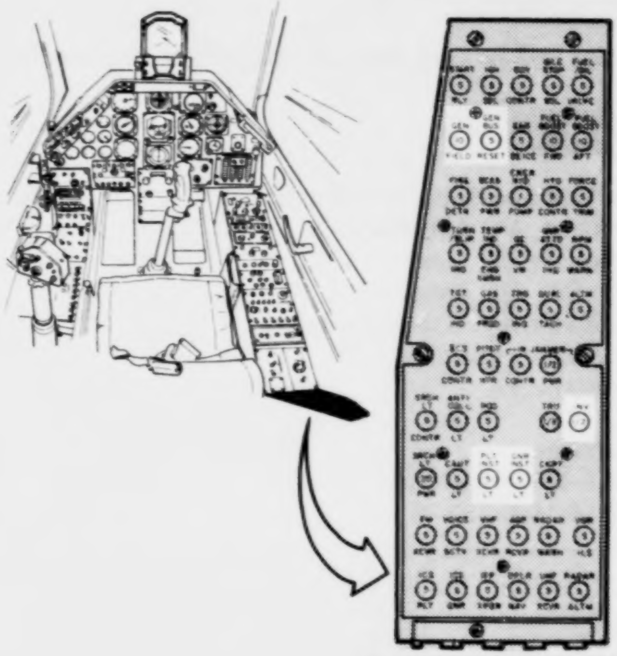
1. APPLY POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, SEE PARA 2-7.



3-19. TSU CONTROL OF TURRET TEST (cont)

TSU CONTROL OF TURRET TEST (cont)

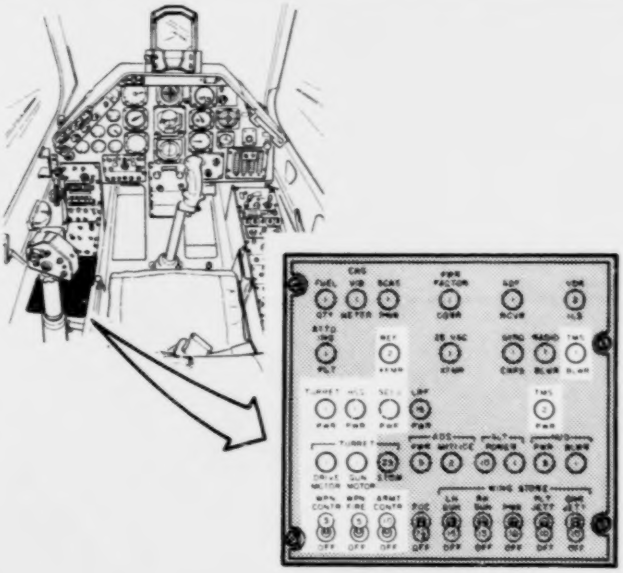
2. CLOSE FOLLOWING CIRCUIT BREAKERS ON DC CIRCUIT BREAKER PANEL:
   - GEN FIELD
   - GEN BUS RESET
   - INV
   - PLT INST LT
   - GNR INST LT



DC CIRCUIT BREAKER PANEL

ARR82-26698

3. CLOSE FOLLOWING CIRCUIT BREAKERS ON AC/ARMAMENT CIRCUIT BREAKER PANEL:
   - REF XFMR
   - TMS BLWR
   - TURRET PWR
   - HSS PWR
   - SECU PWR
   - TMS PWR
   - TURRET DRIVE MOTOR
   - TURRET GUN MOTOR
   - WPN CONTR
   - WPN FIRE
   - ARMT CONTR



AC / ARMAMENT CIRCUIT BREAKER PANEL

ARR82-26699

TSU CONTROL OF TURRET TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
4. ON TEST SET, SET AC AND DC CIRCUIT BREAKERS TO ON.		
a. AC and DC power indicators light.	a. Indicators not lighted.	a. Check TURRET PWR and WPN CONTR circuit breakers are closed.
b. 8's appear in REFERENCE CODE displays.	b. Not all 8's in REFERENCE and CODE displays.	b. See TM 9-4933-224-13&P.
c. PASS indicator on test set lights.	c. FAIL indicator on test set lights.	c. See TM 9-4933-224-13&P.
5. ON TEST SET, PRESS RUN KEY.	1000 not in REFERENCE display.	Check cables, see TM 9-4933-224-13&P

CAUTION

If turret slews to position other than stow, set MASTER ARM to OFF.

6. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO ARM.		
a. ARMED indicators on pilot armament control panel and gunner armament control panel light.	a. ARMED indicators not lighted.	a-1. Check ARMED indicator bulbs. Perform CHECKOUT OF PILOT ARMAMENT CONTROL PANEL (PARA 3-38).
		a-2. Perform CHECKOUT OF LOGIC RELAY ASSEMBLY (PARA 3-40.1).
		a-3. Check aircraft wiring, see TM 55-1520-236-23.
b. Turret in stow position.	b. Turret slews to position other than stow.	b-1. Aline az or el resolver. Notify next higher level of maintenance.
		b-2. Perform CHECKOUT OF TURRET CONTROL UNIT (PARA 3-36).

3-19. TSU CONTROL OF TURRET TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
6. (cont)		
	c. Turret oscillates.	c-1. Perform CHECKOUT OF TURRET CONTROL UNIT (PARA 3-36).
		c-2. Check antibacklash gears for preload. Notify next higher level of maintenance.
		c-3. Replace az and/or el buffer amplifiers, see REPAIR OF TURRET ELECTRICAL COMPONENTS (PARA 3-56).
		c-4. Replace az and/or el tachometers. See REPAIR OF AZIMUTH DRIVE (PARA 3-57) for az tachometer. See REPAIR OF TURRET ELECTRICAL COMPONENTS (PARA 3-56) for el tachometer.
	d. Turret drifts in az or el.	d-1. Perform CHECKOUT OF INTERFACE CONTROL UNIT (PARA 3-39).
		d-2. Perform CHECKOUT OF TURRET CONTROL UNIT (PARA 3-36).
		d-3. Replace az and/or el buffer amplifier, see REPAIR OF TURRET ELECTRICAL COMPONENTS (PARA 3-56).
	e. Turret not energized.	e. Continue test.
7. ON TOW CONTROL PANEL, SET MODE SELECT SWITCH TO TSU/GUN.		
8. PRESS A, 9, AND RUN KEYS ON TEST SET.		
PASS indicator on test set lights.	FAIL indicator on test set lights.	Record all fault codes using NEXT LINE key. Perform corrective action as described in fault code data.

TSU CONTROL OF TURRET TEST (cont)

Test Condition/ Normal Indication	Abnormal indication	Corrective Action
9. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO STBY.		
10. ON SHC, SET ACQ/TRK/ STOW SWITCH TO TRK.		
11. USING SHC, POSITION TSU LOS TO 0° AZ, 0° EL.		
12. PRESS AND HOLD LHG ACTION SWITCH.		
a. Turret alines with TSU LOS.	a. Turret does not aline with TSU LOS.	a. Perform CHECKOUT OF INTERFACE CONTROL UNIT (PARA 3-39).
	b. Turret drifts in az or el.	b. Perform CHECKOUT OF INTERFACE CONTROL UNIT (PARA 3-39).
	c. Turret does not move from stow.	c. Continue test.
13. WITH LHG ACTION SWITCH PRESSED, PRESS A, 3, AND RUN KEYS ON TEST SET.		
PASS indicator on test set lights.	FAIL indicator on test set lights.	Record all fault codes using NEXT LINE key. Perform corrective action as described in fault code data.

3-19. TSU CONTROL OF TURRET TEST (cont)

Test Condition/ Normal Indication	**Abnormal Indication**	**Corrective Action**
14. WITH LHG ACTION SWITCH PRESSED, USING SHC MOVE TSU, UP, RIGHT, AND LEFT.		
a. Turret tracks TSU.	a. Turret does not track TSU in az or el.	a-1. Perform CHECKOUT OF TURRET CONTROL UNIT (PARA 3-36).
		a-2. Replace az or el drive motor.
	b. Turret moves in high rate.	b. Perform CHECKOUT OF TURRET CONTROL UNIT (PARA 3-36).
15. RELEASE LHG ACTION SWITCH.		
16. ON GUNNER ARMAMENT CONTROL PANEL, SET TUR SLEW SWITCH TO NORM.		
17. WITH LHG ACTION SWITCH PRESSED, USING SHC MOVE TSU UP, RIGHT, AND LEFT.		
Turret tracks TSU at high rate.	Turret does not track TSU at high rate.	Perform CHECKOUT OF TURRET CONTROL UNIT (PARA 3-36).
18. RELEASE LHG ACTION SWITCH.		
19. ON GUNNER ARMAMENT CONTROL PANEL, SET TUR SLEW SWITCH TO GND TEST.		

TSU CONTROL OF TURRET TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
20. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO ARM.		
21. PRESS LHG ACTION SWITCH AND TRIGGER SWITCHES.		
M197 gun alines with TSU and rotates.	M197 gun does not rotate.	1. Perform GUN FUNCTION TEST (PARA 3-26). 2. Perform CHECKOUT OF INTERFACE CONTROL UNIT (PARA 3-39). 3. Perform CHECKOUT OF LOGIC RELAY ASSEMBLY (PARA 3-40.1). 4. Check trigger switch, see TM 55-1520-236-23.
22. RELEASE LHG ACTION SWITCH.		
23. ON TCP, SET MODE SELECT SWITCH TO OFF.		
24. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO OFF.		

25. REMOVE POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL PARA 2-7, AND DISCONNECT TEST SET.

3-19. TSU CONTROL OF TURRET TEST (cont)

TSU CONTROL OF TURRET TEST — FAULT CODE DATA

Fault Code	Corrective Action	Reference Paragraph
1461	Perform CHECKOUT OF PILOT ARMAMENT CONTROL PANEL.	PARA 3-38
1462	Perform CHECKOUT OF LOGIC RELAY ASSEMBLY.	PARA 3-40.1
1463	Perform CHECKOUT OF LOGIC RELAY ASSEMBLY.	PARA 3-40.1
1464	1. Perform CHECKOUT OF GUN CONTROL UNIT.	PARA 3-35
	2. Check turret power overload sensor, see TM 55-1520-236-23.	
1465	1. Perform CHECKOUT OF GUN CONTROL UNIT.	PARA 3-35
	2. Perform CHECKOUT OF LOGIC RELAY ASSEMBLY.	PARA 3-40.1
1466	Perform CHECKOUT OF GUN CONTROL UNIT.	PARA 3-35
1467	Perform CHECKOUT OF GUN CONTROL UNIT.	PARA 3-35
1468	Perform CHECKOUT OF GUN CONTROL UNIT.	PARA 3-35
1471	Perform CHECKOUT OF GUN CONTROL UNIT.	PARA 3-35
1472	1. Perform CHECKOUT OF LOGIC CONTROL UNIT.	PARA 3-34
	2. Perform CHECKOUT OF GUN CONTROL UNIT.	PARA 3-35
1473	Perform CHECKOUT OF LOGIC CONTROL UNIT.	PARA 3-34
1474	Perform CHECKOUT OF LOGIC CONTROL UNIT.	PARA 3-34
1475	1. Perform CHECKOUT OF TURRET CONTROL UNIT.	PARA 3-36
	2. Perform CHECKOUT OF EMERGENCY STOW CONTROL UNIT.	PARA 3-33
1476	1. Perform CHECKOUT OF LOGIC CONTROL UNIT.	PARA 3-34
	2. Perform CHECKOUT OF TURRET CONTROL UNIT.	PARA 3-36
1477	Perform CHECKOUT OF TURRET CONTROL UNIT.	PARA 3-36

TSU CONTROL OF TURRET TEST — FAULT CODE DATA (cont)

Fault Code	Corrective Action	Reference Paragaph
1478	Perform CHECKOUT OF LOGIC CONTROL UNIT.	PARA 3-34
1481	Perform CHECKOUT OF TURRET CONTROL UNIT.	PARA 3-36
1482	Perform CHECKOUT OF LOGIC CONTROL UNIT.	PARA 3-34
1483	1. Perform CHECKOUT OF TURRET CONTROL UNIT.	PARA 3-36
	2. Perform CHECKOUT OF LOGIC CONTROL UNIT.	PARA 3-34
	3. Perform CHECKOUT OF PILOT ARMAMENT CONTROL PANEL.	PARA 3-38
1484	Perform CHECKOUT OF LOGIC CONTROL UNIT.	PARA 3-34
1485	1. Perform CHECKOUT OF TURRET CONTROL UNIT.	PARA 3-36
	2. Perform CHECKOUT OF LOGIC CONTROL UNIT.	PARA 3-34
1486	Replace azimuth proximity switches, notify next higher level of maintenance.	
1487	Replace azimuth proximity switches, notify next higher level of maintenance.	
1488	Replace elevation proximity switches, see REPAIR OF TURRET ELECTRICAL COMPONENTS.	PARA 3-56
1491	Replace elevation proximity switches, see REPAIR OF TURRET ELECTRICAL COMPONENTS.	PARA 3-56
1492	1. Check fuses in interface control unit.	
	2. Perform CHECKOUT OF INTERFACE CONTROL UNIT.	PARA 3-39
1493	Perform CHECKOUT OF INTERFACE CONTROL UNIT.	PARA 3-39
1501	Perform CHECKOUT OF GUNNER ARMAMENT CONTROL PANEL.	PARA 3-37
1502	1. Perform CHECKOUT OF GUNNER ARMAMENT CONTROL PANEL.	PARA 3-37
	2. Perform CHECKOUT OF TURRET CONTROL UNIT.	PARA 3-36
1503	Perform CHECKOUT OF PILOT ARMAMENT CONTROL PANEL.	PARA 3-38
1250	1. Perform CHECKOUT OF LOGIC RELAY ASSEMBLY.	PARA 3-40.1
	2. Check ACQ/TRK/STOW switch, see TM 55-1520-236-23 and TM 9-1425-473-20.	

3-19. TSU CONTROL OF TURRET TEST (cont)

Fault Code	Corrective Action	Reference Paragraph
1251	1. Perform CHECKOUT OF LOGIC RELAY ASSEMBLY.	PARA 3-40.1
	2. Check LHG action switch, see TM 55-1520-236-23 and TM 9-1425-473-20.	
1252	1. Perform CHECKOUT OF TURRET CONTROL UNIT.	PARA 3-36
	2. Perform CHECKOUT OF INTERFACE CONTROL UNIT.	PARA 3-39
1253	Perform CHECKOUT OF LOGIC CONTROL UNIT.	PARA 3-34
1254	Perform CHECKOUT OF TURRET CONTROL UNIT.	PARA 3-36
1255	1. Perform CHECKOUT OF LOGIC CONTROL UNIT.	PARA 3-34
	2. Perform CHECKOUT OF TURRET CONTROL UNIT.	PARA 3-36
1256	Perform CHECKOUT OF LOGIC CONTROL UNIT.	PARA 3-34
1257	Perform CHECKOUT OF LOGIC CONTROL UNIT.	PARA 3-34
1258	Perform CHECKOUT OF LOGIC CONTROL UNIT.	PARA 3-34
1261	Perform CHECKOUT OF TURRET CONTROL UNIT.	PARA 3-36
1262	Perform CHECKOUT OF LOGIC CONTROL UNIT.	PARA 3-34
1263	Perform CHECKOUT OF LOGIC CONTROL UNIT.	PARA 3-34
1264	Perform CHECKOUT OF LOGIC CONTROL UNIT.	PARA 3-34

END OF TEST

3-20. PROXIMITY SWITCH TEST

DESCRIPTION

This test covers: Checkout of azimuth and elevation proximity switches.

INITIAL SETUP

Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental

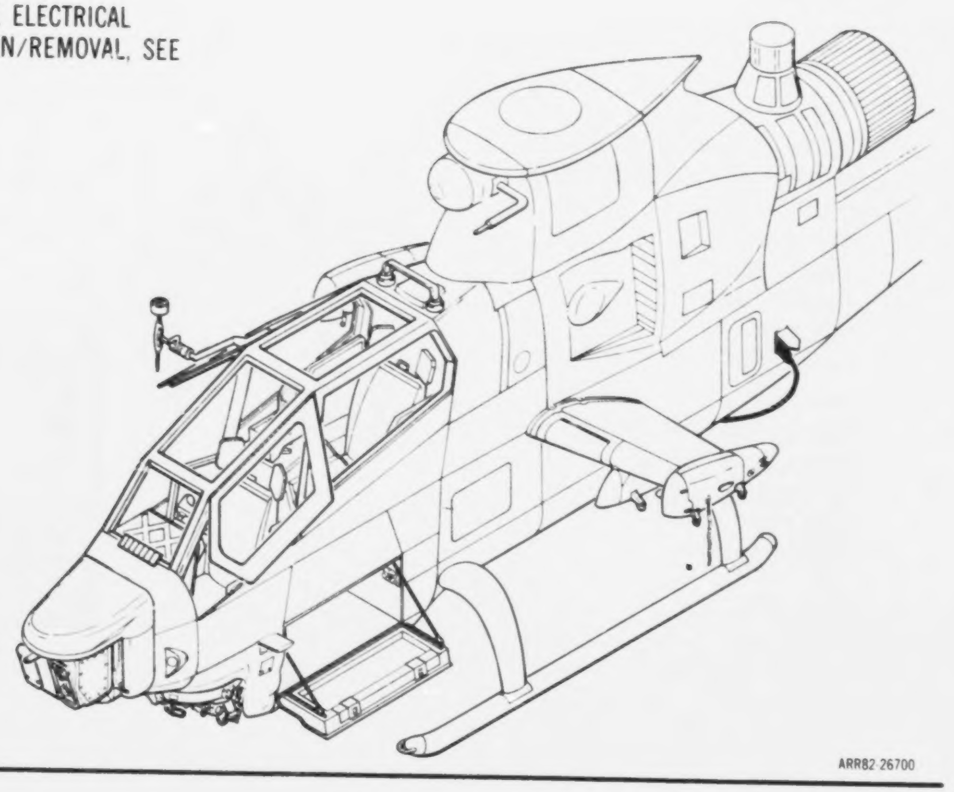
References:
  TM 9-1425-473-20

Personnel Required: (2)
  68J Aircraft Fire Control Repairer/
  68M Aircraft Weapon Systems Repairer

Equipment Conditions:
  Gun barrels removed,
    see REMOVAL/INSTALLATION
    OF M197 GUN BARRELS,
    para 3-44.
  TSU window cover removed.

PROXIMITY SWITCH TEST

1. APPLY POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, SEE PARA 2-7.

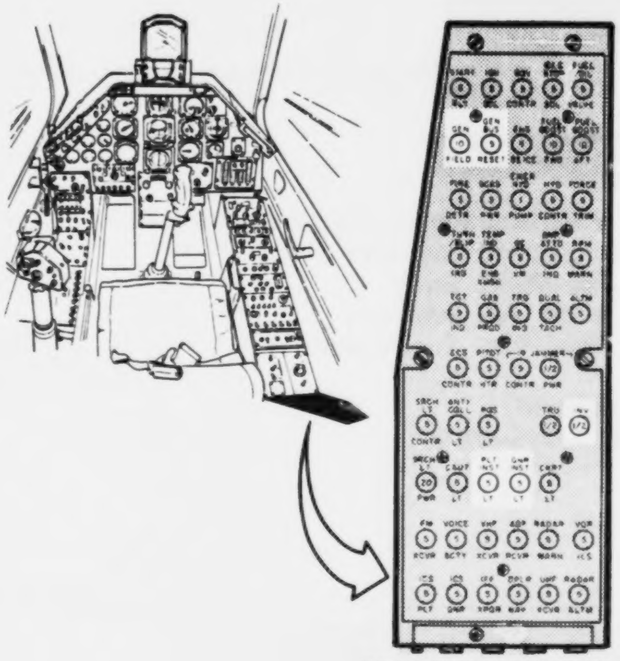


ARR82-26700

3-20. PROXIMITY SWITCH TEST (cont)

PROXIMITY SWITCH TEST (cont)

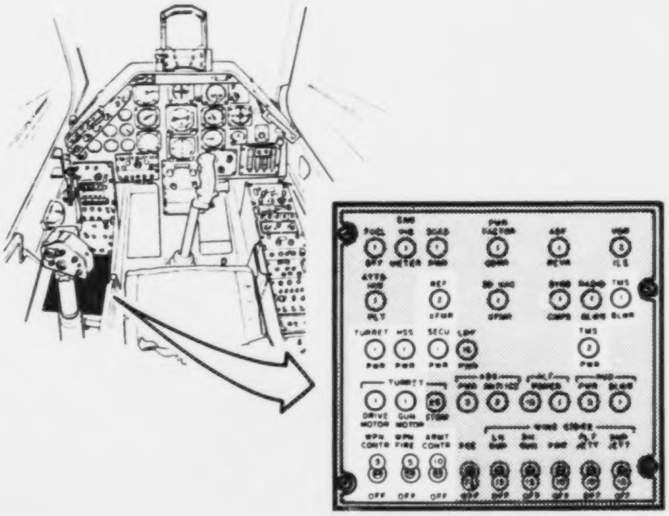
2. CLOSE FOLLOWING CIRCUIT BREAKERS ON DC CIRCUIT BREAKER PANEL:
   - GEN FIELD
   - GEN BUS RESET
   - INV
   - PLT INST LT
   - GNR INST LT



DC CIRCUIT BREAKER PANEL

ARR82-26701

3. CLOSE FOLLOWING CIRCUIT BREAKERS ON AC/ARMAMENT CIRCUIT BREAKER PANEL:
   - REF XFMR
   - TMS BLWR
   - TURRET PWR
   - HSS PWR
   - SECU PWR
   - TMS PWR
   - TURRET DRIVE MOTOR
   - TURRET GUN MOTOR
   - WPN CONTR
   - WPN FIRE
   - ARMT CONTR



AC / ARMAMENT
CIRCUIT BREAKER PANEL

ARR82-26702

PROXIMITY SWITCH TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
4. ON GUNNER ARMAMENT CONTROL PANEL, SET LASER SAFE/TURRET DEPR LIMIT SWITCH TO OFF.		
5. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO ARM.		
Turret in stow position.	Turret slews to position other than stow.	Perform TSU CONTROL OF TURRET TEST (PARA 3-19).
6. ON TOW CONTROL PANEL, SET MODE SELECT SWITCH TO TSU/GUN.		

3-20. PROXIMITY SWITCH TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
7. ON SHC, SET ACQ/TRK/ STOW SWITCH TO TRK.		
8. POSITION TSU LOS TO 0° EL 0° AZ.		
TSU follows SHC.	TSU does not respond.	See TM 9-1425-473-20.
9. PRESS AND HOLD LHG ACTION SWITCH AND SLOWLY MOVE TSU LOS UP/DOWN, RIGHT/LEFT INTO EACH LIMIT; MOMENTARILY PRESS TRIGGER SWITCH IN EACH LIMIT.		
a. Turret alines with TSU LOS.	a. Turret does not aline.	a. Adjust proximity switches, see next higher level of maintenance.
b. Turret stops tracking TSU LOS prior to hitting mechanical stops in each position.	b. Turret hits mechanical stop.	b-1. Replace elevation and/or azimuth proximity switches. See REPAIR OF TURRET ELECTRICAL COMPONENTS (PARA 3-56) for elevation proximity switches. Notify next higher level of maintenance for azimuth proximity switches.
		b-2. Perform CHECKOUT OF TURRET CONTROL UNIT (PARA 3-36).
c. At limit G battle flag is flashing in TSU FOV and M197 gun does not rotate.	c. G battle flag is steady in TSU FOV and M197 gun rotates.	c-1. Perform CHECKOUT OF GUN CONTROL UNIT (PARA 3-35).
		c-2. Perform CHECKOUT OF INTERFACE CONTROL UNIT (PARA 3-39).
		c-3. Replace elevation and/or azimuth proximity switches. See REPAIR OF TURRET ELECTRICAL COMPONENTS (PARA 3-56) for elevation proximity switches. Notify next higher level of maintenance for azimuth proximity switches.
		c-4. See TM 9-1425-473-20.

PROXIMITY SWITCH TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
10. RELEASE LHG ACTION SWITCH.		
11. ON TOW CONTROL PANEL, SET MODE SELECT SWITCH TO OFF.		
12. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO OFF.		
13. ON GUNNER ARMAMENT CONTROL PANEL, SET LASER SAFE/TURRET DEPR LIMIT SWITCH TO ON.		
14. REMOVE POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL PARA 2-7.		

END OF TEST

3-21. DEPRESSION LIMIT TEST

DESCRIPTION

This test covers: Checkout of depression limit function.

INITIAL SETUP

Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental

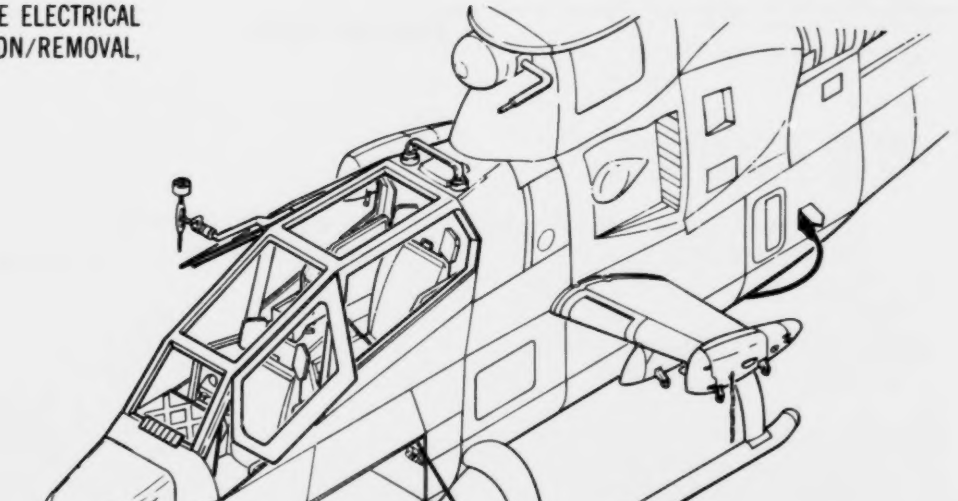
References:
  TM 9-1425-473-20

Personnel Required: (2)
  68J Aircraft Fire Control Repairer/
  68M Aircraft Weapon Systems Repairer

Equipment Conditions:
  HELICOPTER ARMAMENT SUB-SYSTEM MAINTENANCE SETUP performed, para 2-6.
  TSU window cover removed.

DEPRESSION LIMIT TEST

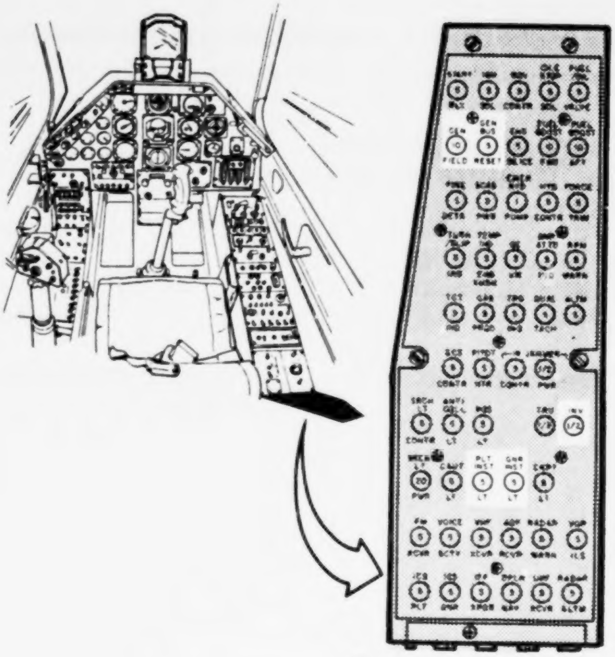
1. APPLY POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.



ARR82-26703

DEPRESSION LIMIT TEST (cont)

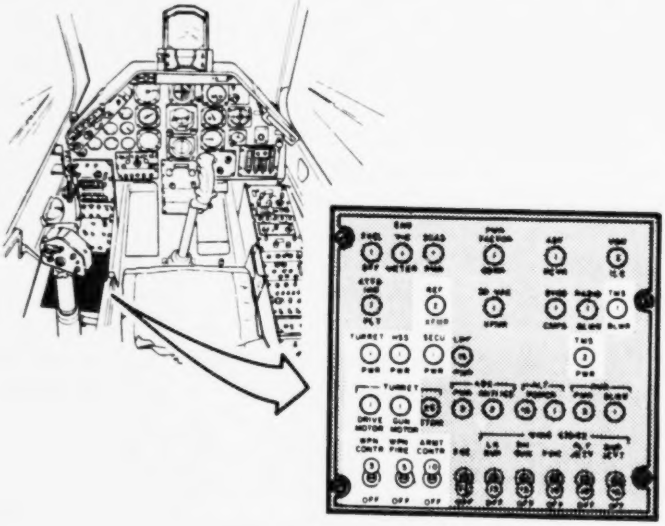
2. CLOSE FOLLOWING CIRCUIT BREAKERS ON DC CIRCUIT BREAKER PANEL:
   GEN FIELD
   GEN BUS RESET
   INV
   PLT INST LT
   GNR INST LT


GEN
FIELD
GEN
BUS
RESET
INV
1/2
PLT
INST
LT
GNR
INST
LT
VOICE
RADAR

DC CIRCUIT BREAKER PANEL

ARR82-26704

3. CLOSE FOLLOWING CIRCUIT BREAKERS ON AC/ARMAMENT CIRCUIT BREAKER PANEL:
   REF XFMR
   TMS BLWR
   TURRET PWR
   HSS PWR
   SECU PWR
   TMS PWR
   TURRET DRIVE MOTOR
   TURRET GUN MOTOR
   WPN CONTR
   WPN FIRE
   ARMT CONTR


REF
TMS
BLWR
TURRET
HSS
SECU
PWR
TMS
PWR
TURRET
DRIVE
MOTOR
GUN
MOTOR
WPN
CONTR
WPN
FIRE
ARMT
CONTR
OFF

AC / ARMAMENT
CIRCUIT BREAKER PANEL

ARR82-26705

3-21. DEPRESSION LIMIT TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
4. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO STBY.		
5. ON TOW CONTROL PANEL, SET MODE SELECT SWITCH TO TSU/GUN.		
Turret in stow position.	Turret slews to position other than stow.	Perform TSU CONTROL OF TURRET TEST (PARA 3-19).

DEPRESSION LIMIT TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
6. ON SHC, SET ACQ/TRK/STOW SWITCH TO TRK.		
7. POSITION TSU LOS TO 0° EL 0° AZ.		
TSU follows SHC.	TSU does not respond.	See TM 9-1425-473-20.
CAUTION **Observer should be stationed outside to warn TSU operator against striking gun barrels on ground.**		
8. PRESS AND HOLD LHG ACTION SWITCH AND SLOWLY ROTATE TSU LOS DOWN UNTIL G BATTLE FLAG STARTS FLASHING IN TSU FOV.		
Turret stops tracking TSU LOS at approximately -5° el.	a. Turret continues below -5° el.	a-1. On GUNNER ARMAMENT CONTROL PANEL make sure LASER SAFE/ TURRET DEPR LIMIT switch is set to on.
		a-2. Perform CHECKOUT OF LOGIC CONTROL UNIT (PARA 3-34).
		a-3. Perform CHECKOUT OF GUNNER ARMAMENT CONTROL PANEL (PARA 3-37).
	b. G battle flag remains steady with turret in depression limit.	b-1. Perform CHECKOUT OF GUN CONTROL UNIT (PARA 3-35).
		b-2. Perform CHECKOUT OF INTERFACE CONTROL UNIT (PARA 3-39).
		b-3. See TM 9-1425-473-20.
9. RELEASE LHG ACTION SWITCH.		

3-21. DEPRESSION LIMIT TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
10. ON TOW CONTROL PANEL, SET MODE SELECT SWITCH TO OFF.		
11. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO OFF.		
12. REMOVE POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.		

END OF TEST

3-22. GHS AND PHS CONTROL OF TURRET TEST

DESCRIPTION

This test covers: Checkout of the GHS and PHS control of the turret.

INITIAL SETUP

Tools/Test and Support Equipment:
Tool Set, A/C Armament
Repairman: Basic
Tool Set, A/C Armament
Repairman: Supplemental

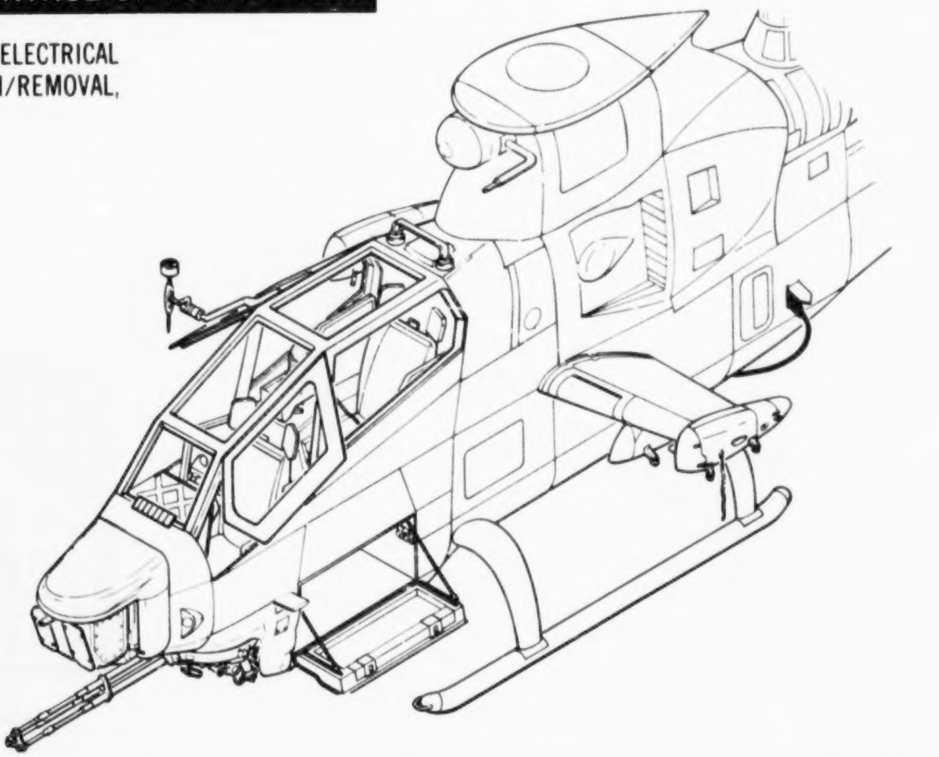
References:
TM 9-1270-212-14&P

Personnel Required: (2)
68J Aircraft Fire Control Repairer/
68M Aircraft Weapon Systems Repairer

Equipment Conditions:
HELICOPTER ARMAMENT SUB-SYSTEM MAINTENANCE SETUP performed, para 2-6.
GHS and PHS installed, see TM 9-1270-212-14&P.

GHS AND PHS CONTROL OF TURRET TEST

1. APPLY POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, SEE PARA 2-7.

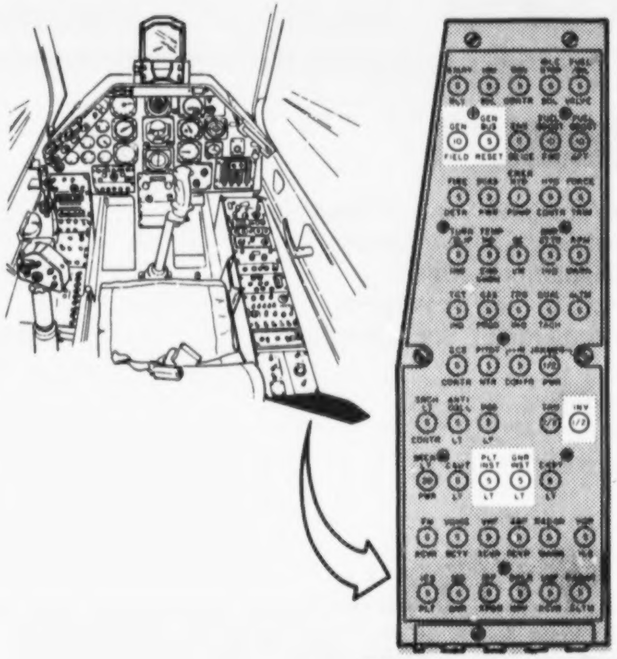


ARR82-26706

3-22. GHS AND PHS CONTROL OF TURRET TEST (cont)

GHS AND PHS CONTROL OF TURRET TEST (cont)

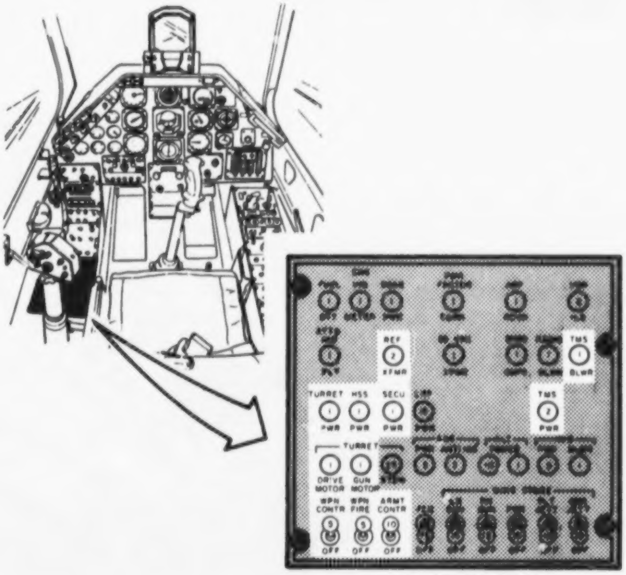
2. CLOSE FOLLOWING CIRCUIT BREAKERS ON DC CIRCUIT BREAKER PANEL:
   - GEN FIELD
   - GEN BUS RESET
   - INV
   - PLT INST LT
   - GNR INST LT


GEN 10 FIELD
GEN BUS 5 RESET
INV 1/2
PLT INST 5 LT
GNR INST 5 LT

DC CIRCUIT BREAKER PANEL

ARR82-26707

3. CLOSE FOLLOWING CIRCUIT BREAKERS ON AC/ARMAMENT CIRCUIT BREAKER PANEL:
   - REF XFMR
   - TMS BLWR
   - TURRET PWR
   - HSS PWR
   - SECU PWR
   - TMS PWR
   - TURRET DRIVE MOTOR
   - TURRET GUN MOTOR
   - WPN CONTR
   - WPN FIRE
   - ARMT CONTR


REF 2 XFMR
TMS 1 BLWR
TURRET 1 PWR
HSS 1 PWR
SECU 1 PWR
TMS 2 PWR
TURRET
DRIVE MOTOR 1
GUN MOTOR 1
WPN CONTR 5 OFF
WPN FIRE 5 OFF
ARMT CONTR 10 OFF

AC / ARMAMENT CIRCUIT BREAKER PANEL

ARR82-26708

GHS AND PHS CONTROL OF TURRET TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
4. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO STBY.		
Turret in stow position.	Turret slews to position other than stow.	1. Perform TSU CONTROL OF TURRET TEST (PARA 3-19). 2. Perform CHECKOUT OF INTERFACE CONTROL UNIT (PARA 3-39).

3-22. GHS AND PHS CONTROL OF TURRET TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
5. WITH GHS AT APPROXIMATELY 0° EL, 0° AZ, PRESS AND HOLD LHG ACTION SWITCH.		
Turret alines with GHS and reticle on steady.	a. Turret alines to position other than GHS LOS.	Aline HS resolvers, see TM 9-1270-212-14&P.
	b. Turret drifts in az or el.	b-1. Perform CHECKOUT OF INTERFACE CONTROL UNIT (PARA 3-39). b-2. Check helmet sight, see TM 9-1270-212-14&P.
	c. Turret does not move from stow position.	c-1. Perform TSU CONTROL OF TURRET TEST (PARA 3-19). c-2. Perform CHECKOUT OF LOGIC RELAY ASSEMBLY (PARA 3-40.1)
	d. Reticle flashing.	d-1. Perform CHECKOUT OF GUN CONTROL UNIT (PARA 3-35). d-2. Perform PROXIMITY SWITCH TEST (PARA 3-20).
	e. Reticle not on.	e-1. Perform CHECKOUT OF INTERFACE CONTROL UNIT (PARA 3-39). e-2. Check helmet sight, see TM 9-1270-212-14&P.
6. WITH LHG ACTION SWITCH PRESSED, SLOWLY MOVE GHS UP, DOWN, RIGHT, AND LEFT.		
Turret follows GHS.	Turret does not track GHS.	Perform CHECKOUT OF INTERFACE CONTROL UNIT (PARA 3-39).
7. RELEASE LHG ACTION SWITCH.		

GHS AND PHS CONTROL OF TURRET TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
8. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO ARM.		
9. WITH GHS AT APPROXIMATELY 0° EL 0° AZ, PRESS LHG ACTION AND TRIGGER SWITCHES.		
Turret alines with GHS and M197 gun rotates.	M197 gun does not rotate.	1. Perform GUN FUNCTION TEST (PARA 3-26). 2. Perform CHECKOUT OF INTERFACE CONTROL UNIT (PARA 3-39). 3. Perform CHECKOUT OF LOGIC RELAY ASSEMBLY (PARA 3-40.1).
10. RELEASE LHG ACTION AND TRIGGER SWITCHES.		

3-22. GHS AND PHS CONTROL OF TURRET TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
11. ON PILOT ARMAMENT CONTROL PANEL, SET WPN CONTR SWITCH TO PILOT.		
12. WITH PHS AT APPROXIMATELY 0° EL 0° AZ, PRESS AND HOLD PILOT CYCLIC STICK ACTION SWITCH.		
Turret alines with PHS and reticle on steady.	a. Turret alines to position other than PHS LOS.	a. Aline HS resolvers, see TM 9-1270-212-14&P.
	b. Turret drift in el or az.	b. Perform CHECKOUT OF INTERFACE CONTROL UNIT (PARA 3-39).
	c. Turret does not move from stow.	c. Perform TSU CONTROL OF TURRET TEST (PARA 3-19).
	d. Reticle not on.	d. Check helmet sight, see TM 9-1270-212-14&P.
13. WITH PILOT CYCLIC STICK ACTION SWITCH PRESSED, SLOWLY MOVE PHS UP, DOWN, RIGHT, AND LEFT.		
Turret follows PHS.	Turret does not follow PHS.	Perform CHECKOUT OF INTERFACE CONTROL UNIT (PARA 3-39).
14. RELEASE PILOT CYCLIC STICK ACTION SWITCH.		

GHS AND PHS CONTROL OF TURRET TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
15. WITH PHS AT APPROXIMATELY 0° AZ 0° EL, PRESS PILOT CYCLIC STICK ACTION AND TRIGGER SWITCHES.		
Turret alines with PHS and M197 gun rotates.	M197 gun does not rotate.	1. Perform CHECKOUT OF INTERFACE CONTROL UNIT (PARA 3-39). 2. Perform CHECKOUT OF LOGIC RELAY ASSEMBLY (PARA 3-40.1).
16. RELEASE PILOT CYCLIC STICK ACTION AND TRIGGER SWITCHES.		
17. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO OFF AND WPN CONTR SWITCH TO GUNNER.		

18. REMOVE POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.

END OF TEST

3-23. PILOT OVERRIDE TEST

DESCRIPTION

This test covers: Checkout of pilot override functions.

INITIAL SETUP

Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental

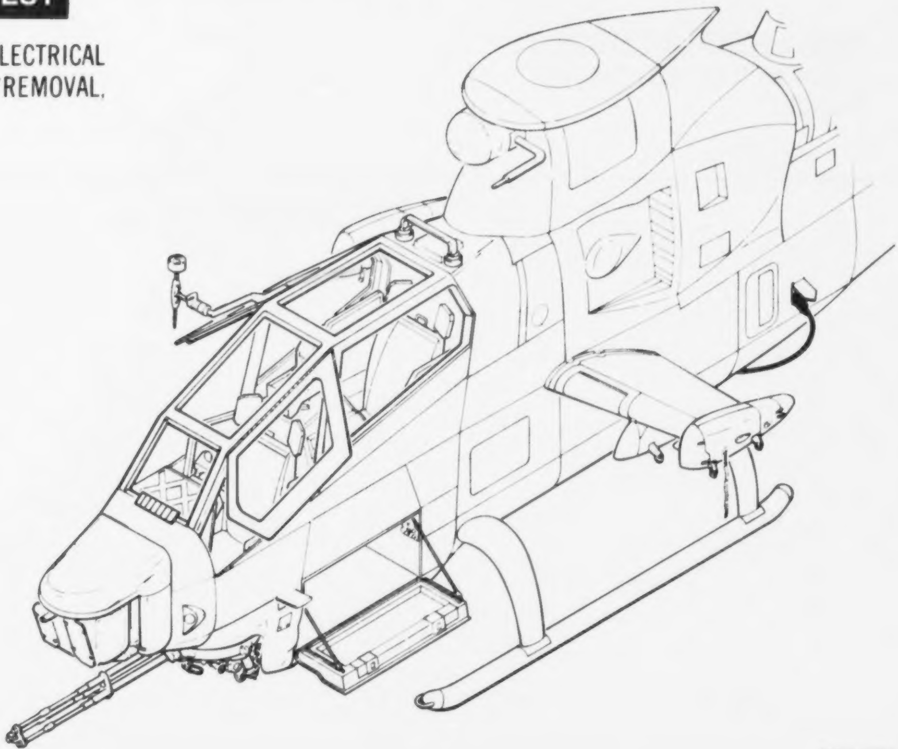
References:
  TM 9-1270-212-14&P

Personnel Required: (2)
  68J Aircraft Fire Control Repairer/
  68M Aircraft Weapon Systems Repairer

Equipment Conditions:
  HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP performed, para 2-6.
  GHS installed, see TM 9-1270-212-14&P

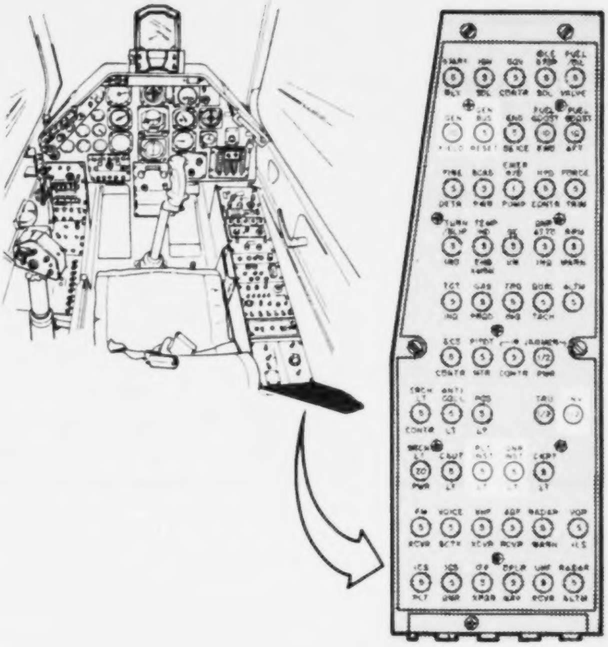
PILOT OVERRIDE TEST

1. APPLY POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, SEE PARA 2-7.



PILOT OVERRIDE TEST (cont)

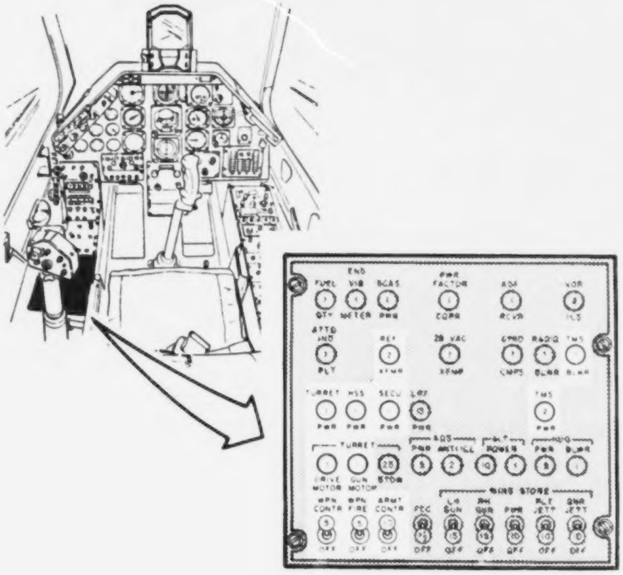
2. CLOSE FOLLOWING CIRCUIT BREAKERS ON DC CIRCUIT BREAKER PANEL:
    - GEN FIELD
    - GEN BUS RESET
    - INV
    - PLT INST LT
    - GNR INST LT



DC CIRCUIT BREAKER PANEL

ARR82 26713

3. CLOSE FOLLOWING CIRCUIT BREAKERS ON AC/ARMAMENT CIRCUIT BREAKER PANEL:
    - REF XFMR
    - TMS BLWR
    - TURRET PWR
    - HSS PWR
    - SECU PWR
    - TMS PWR
    - TURRET DRIVE MOTOR
    - TURRET GUN MOTOR
    - WPN CONTR
    - WPN FIRE
    - ARMT CONTR



AC / ARMAMENT CIRCUIT BREAKER PANEL

ARR82 26714

3-23. PILOT OVERRIDE TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
4. ON GUNNER ARMAMENT CONTROL PANEL, SET PLT ORIDE SWITCH TO PLT ORIDE.		
Turret in stow position.	Turret slews to position other than stow.	1. Perform TSU CONTROL OF TURRET TEST (PARA 3-19). 2. Perform CHECKOUT OF INTERFACE CONTROL UNIT (PARA 3-39). 3. Perform CHECKOUT OF LOGIC RELAY ASSEMBLY (PARA 3-40.1).
5. PRESS AND HOLD GUNNER CYCLIC STICK ACTION SWITCH AND SLOWLY MOVE GHS UP, DOWN, LEFT, AND RIGHT.		
Turret follows GHS.	Turret alines to position other than GHS LOS.	Perform GHS AND PHS CONTROL OF TURRET TEST (PARA 3-22).
6. PRESS AND HOLD GUNNER CYCLIC STICK TRIGGER SWITCH.		
M197 gun rotates.	M197 gun does not rotate.	1. Perform GUN FUNCTION TEST (PARA 3-26). 2. Perform CHECKOUT OF INTERFACE CONTROL UNIT (PARA 3-39). 3. Perform CHECKOUT OF LOGIC RELAY ASSEMBLY (PARA 3-40.1).
7. RELEASE GUNNER CYCLIC STICK TRIGGER AND ACTION SWITCHES.		

PILOT OVERRIDE TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
8. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO ARM.		
9. ON PILOT ARMAMENT CONTROL PANEL, SET WPN CONTR SWITCH TO FIXED, PILOT, THEN BACK TO GUNNER.		
Turret does not move.	Turret moves.	1. Perform CHECKOUT OF INTERFACE CONTROL UNIT (PARA 3-39). 2. Perform CHECKOUT OF LOGIC RELAY ASSEMBLY (PARA 3-40.1).
10. SET MASTER ARM SWITCH TO OFF.		
11. ON GUNNER ARMAMENT CONTROL PANEL, SET PLT ORIDE SWITCH TO OFF.		

12. REMOVE POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.

END OF TEST

3-24. ACQUISITION TEST

DESCRIPTION

This test covers: Checkout of gunner and pilot acquisition modes.

INITIAL SETUP

Tools/Test and Support Equipment:
Tool Set, A/C Armament
Repairman: Basic
Tool Set, A/C Armament
Repairman: Supplemental

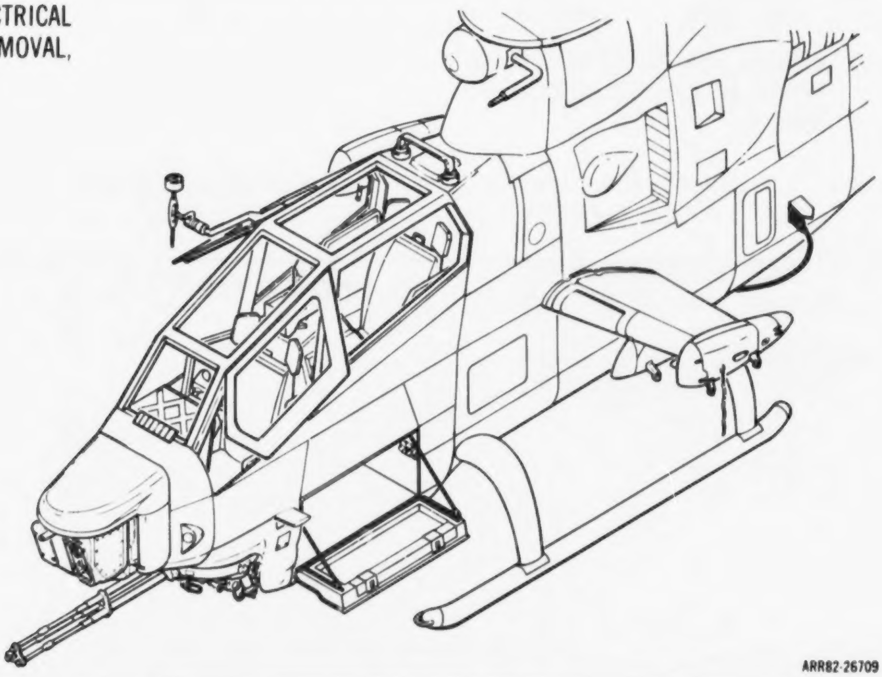
References:
TM 9-1270-212-14&P
TM 9-1425-473-20

Personnel Required: (2)
68J Aircraft Fire Control Repairer/
68M Aircraft Weapon Systems Repairer

Equipment Conditions:
HELICOPTER ARMAMENT SUB-SYSTEM MAINTENANCE SETUP performed, para 2-6.
GHS and PHS installed, see TM 9-1270-212-14&P.
TSU window cover removed.

ACQUISITION TEST

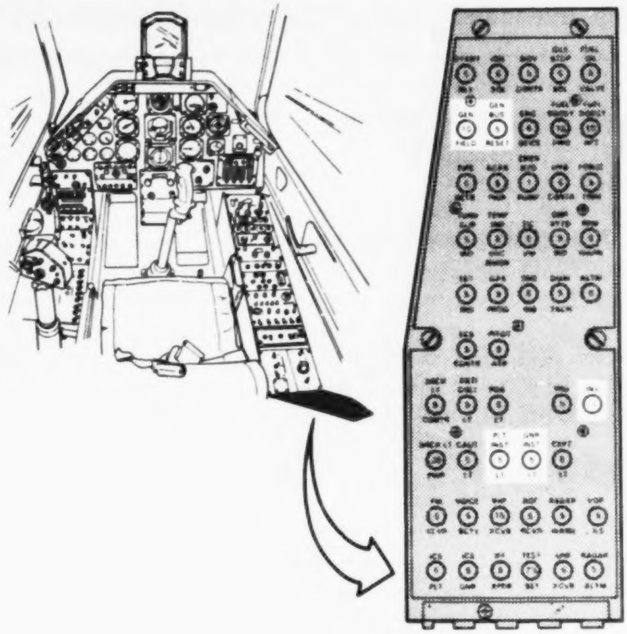
1. APPLY POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.



ARR82-26709

ACQUISITION TEST (cont)

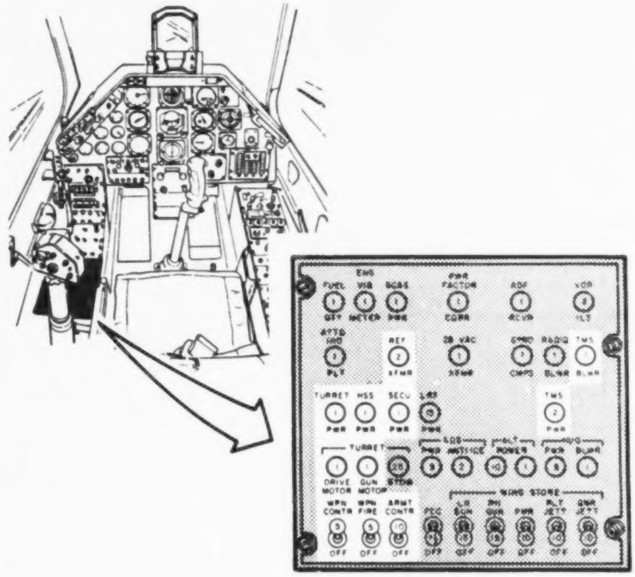
2. CLOSE FOLLOWING CIRCUIT BREAKERS ON DC CIRCUIT BREAKER PANEL:
    - GEN FIELD
    - GEN BUS RESET
    - INV
    - PLT INST LT
    - GNR INST LT


GEN FIELD
GEN BUS RESET
INV
PLT INST LT
GNR INST LT
ICS PLT
ICS GNR
TEST SET
RADAR ALTM
VOR ILS

DC CIRCUIT BREAKER PANEL

ARR82-26710

3. CLOSE FOLLOWING CIRCUIT BREAKERS ON AC/ARMAMENT CIRCUIT BREAKER PANEL:
    - REF XFMR
    - TMS BLWR
    - TURRET PWR
    - HSS PWR
    - SECU PWR
    - TMS PWR
    - TURRET DRIVE MOTOR
    - TURRET GUN MOTOR
    - WPN CONTR
    - WPN FIRE
    - ARMT CONTR


FUEL QTY
ENG VIB METER
PWR FACTOR CORR
ADF RCVR
VOR ILS
ATTD IND PLT
REF XFMR
28 VAC XFMR
RADIO BLWR
TMS BLWR
TURRET PWR
HSS PWR
SECU PWR
TMS PWR
TURRET
DRIVE MOTOR
GUN MOTOR
STOW
ALT POWER
PWR
BLWR
WPN CONTR
WPN FIRE
ARMT CONTR
OFF
WING STORE
PWR
PLT JETT
GNR JETT

AC / ARMAMENT CIRCUIT BREAKER PANEL

ARR82-26711

3-24. ACQUISITION TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
4. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO ARM.		
5. ON TOW CONTROL PANEL, SET MODE SELECT SWITCH TO TSU/GUN.		
6. ON SHC, HOLD ACQ/TRK/STOW SWITCH TO ACQ AND MOVE GHS UP, DOWN, RIGHT, AND LEFT.		
TSU follows GHS.	TSU does not follow GHS.	1. Perform CHECKOUT OF INTERFACE CONTROL UNIT (PARA 3-39). 2. Check TSU, see TM 9-1425-473-20. 3. Check GHS, see TM 9-1270-212-14&P.
7. RELEASE ACQ/TRK/STOW SWITCH.		
GHS reticle retracts.	Reticle does not retract.	Check GHS, see TM 9-1270-212-14&P.

ACQUISITION TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
8. PRESS AND HOLD PHS ACQ SWITCH AND MOVE PHS UP, DOWN, RIGHT, AND LEFT.		
TSU follows PHS.	TSU does not follow PHS.	1. Perform CHECKOUT OF INTERFACE CONTROL UNIT (PARA 3-39). 2. Check TSU, see TM 9-1425-473-20. 3. Check PHS, see TM 9-1270-212-14&P
9. RELEASE PHS ACQ SWITCH.		
10. ON TOW CONTROL PANEL, SET MODE SELECT SWITCH TO OFF.		
11. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO OFF.		
12. REMOVE POWER. SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.		

END OF TEST

3-25. FIXED FORWARD TEST

DESCRIPTION

This test covers: Checkout of fixed forward functions and fault code data.

INITIAL SETUP

Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental
  Electronics Systems Test
    Set: M137

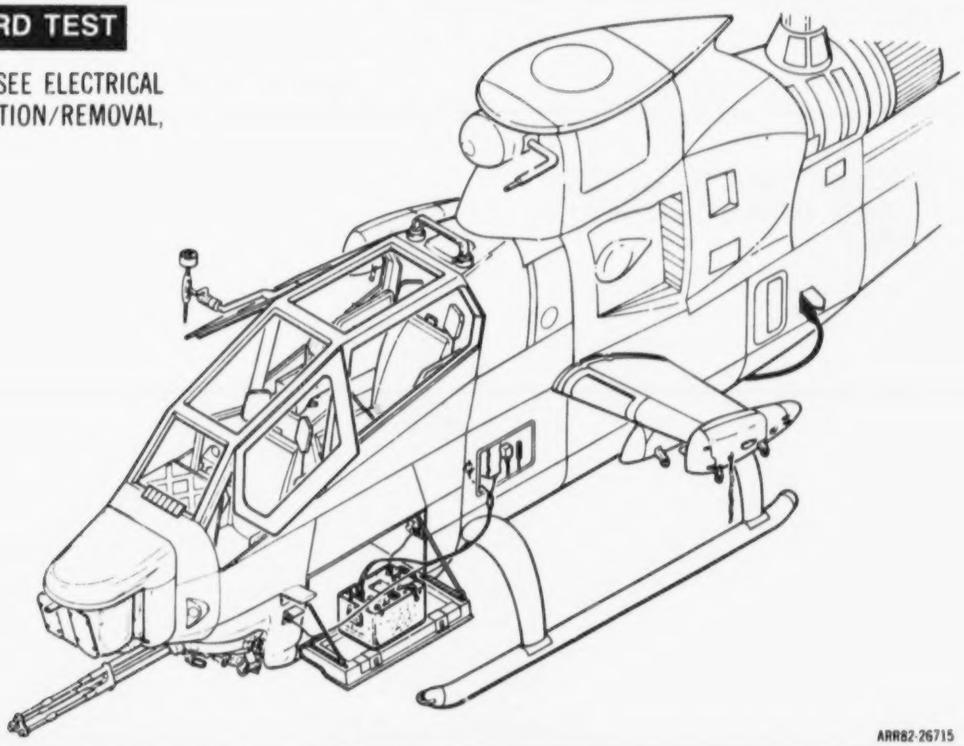
References:
  TM 9-4933-224-13&P
  TM 55-1520-236-23

Personnel Required:
  68J Aircraft Fire Control
    Repairer (2)

Equipment Conditions:
  HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP performed, para 2-6.
  Test set cables W1 and W6 connected, see TEST SET CABLE CONNECTIONS, para 3-17.

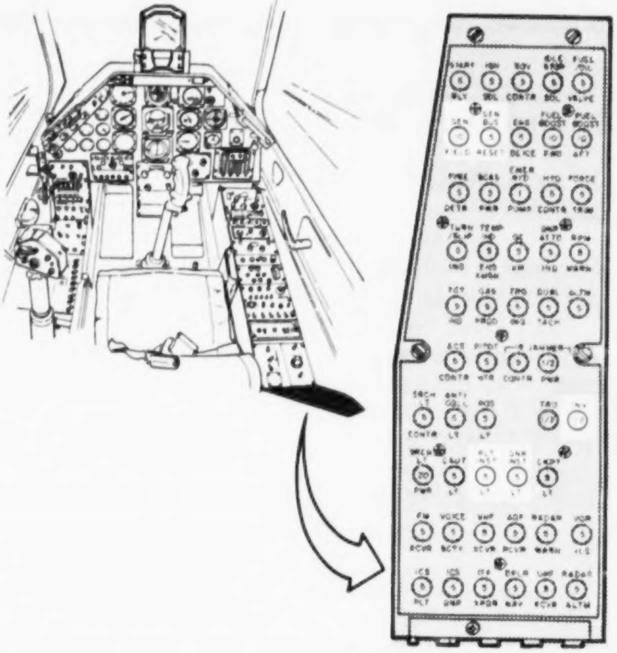
FIXED FORWARD TEST

1. APPLY POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.



FIXED FORWARD TEST (cont)

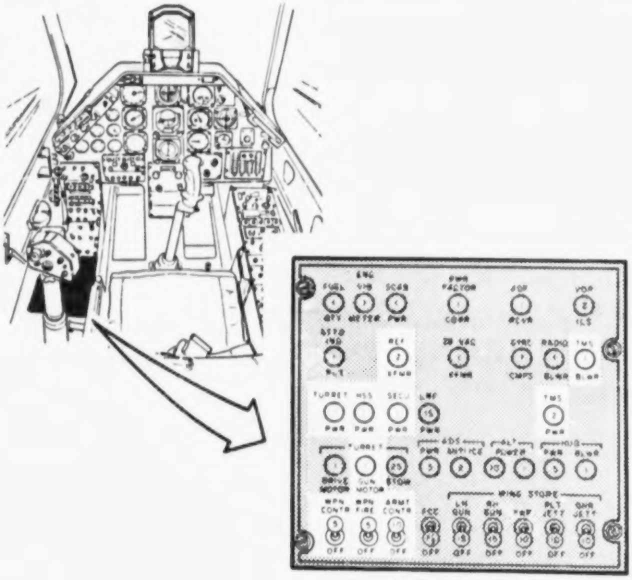
2. CLOSE FOLLOWING CIRCUIT BREAKERS ON DC CIRCUIT BREAKER PANEL:
   - GEN FIELD
   - GEN BUS RESET
   - INV
   - PLT INST LT
   - GNR INST LT


START PLT
IGN SOL
GOV CONTR
IDLE STOP SOL
FUEL/OIL VALVE
GEN FIELD
GEN BUS RESET
ENG DEICE
FUEL BOOST FWD
FUEL BOOST AFT
FIRE DETR
SCAS PWR
HYD CONTR
FORCE TRIM
TURN/SLIP IND
RPM WARN
TGT IND
GAS PROD
TRQ IND
DUAL TACH
SCS CONTR
PITOT HTR
JAMMER
CONTR
PWR
SRCH LT CONTR
ANTI COLL LT
POS LT
SRCH LT PWR
CAUT LT
PLT INST LT
GNR INST LT
CKPT LT
FM RCVR
VOICE SCTY
UHF RCVR
ADF RCVR
RADAR WARN
VOR ICS
ICS PLT
ICS GNR
IFF XPDR
DPLR NAV
UHF RCVR
RADAR ALTM

DC CIRCUIT BREAKER PANEL

ARR82-26716

3. CLOSE FOLLOWING CIRCUIT BREAKERS ON AC/ARMAMENT CIRCUIT BREAKER PANEL:
   - REF XFMR
   - TMS BLWR
   - TURRET PWR
   - HSS PWR
   - SECU PWR
   - TMS PWR
   - TURRET GUN MOTOR
   - WPN CONTR
   - WPN FIRE
   - ARMT CONTR


FUEL QTY
ENG VIB METER
SCAS PWR
PWR FACTOR CORR
ADF RCVR
VOR ILS
REF XFMR
28 VAC XFMR
GYRO CMPS
RADIO BLWR
TMS BLWR
TURRET PWR
HSS PWR
SECU PWR
TMS PWR
TURRET
DRIVE MOTOR
GUN MOTOR
STOW
ADS
PWR
ANTI ICE
POWER
HUD
PWR
BLWR
WING STORE
WPN CONTR
WPN FIRE
ARMT CONTR
FCC
LH GUN
RH GUN
PLT JETT
GNR JETT
OFF

AC / ARMAMENT
CIRCUIT BREAKER PANEL

ARR82-26717

3-25. FIXED FORWARD TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
4. ON TEST SET, SET AC AND DC CIRCUIT BREAKERS TO ON.		
a. AC and DC POWER indicators light.	a. Indicators not lighted.	a. Check TURRET PWR and WPN CONTR circuit breakers are closed.
b. 8's appear in REFERENCE and CODE displays.	b. Not all 8's in REFERENCE and CODE displays.	b. See TM 9-4933-224-13&P.
c. PASS indicator on test set lights.	c. FAIL indicator on test set lights.	c. See TM 9-4933-224-13&P.
5. ON TEST SET, PRESS RUN KEY.		
1000 in REFERENCE display.	1000 not in REFERENCE display.	Check cables, see TM 9-4933-224-13&P.
6. RELEASE DRIVE MOTOR BRAKES AND MANUALLY POSITION TURRET TO APPROXIMATELY 30° RIGHT AZ AND APPROXIMATELY 15° DOWN EL. APPLY DRIVE MOTOR BRAKES.		
7. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO STBY AND WPN CONTR TO FIXED FORWARD.		
8. ON TEST SET, PRESS A, 0, AND RUN KEYS.		
PASS indicator on test set lights.	FAIL indicator lights.	Record all fault codes using NEXT LINE key. Perform corrective action as described in fault code data.

FIXED FORWARD TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
9. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, ENGAGE TURRET DRIVE MOTOR CIRCUIT BREAKER.		
Turret moves to fixed forward.	a. Turret alines to position other than fixed forward.	a-1. Aline resolvers, notify next higher level of maintenance.
		a-2. Perform CHECKOUT OF TURRET CONTROL UNIT (PARA 3-36).
	b. Turret oscillates in az or el.	b-1. Perform CHECKOUT OF TURRET CONTROL UNIT (PARA 3-36).
		b-2. Check az and/or el antibacklash gear. Notify next higher level of maintenance.
		b-3. Replace az and/or el tachometers. See REPAIR OF AZIMUTH DRIVE (PARA 3-57) for az tachometer. See REPAIR OF TURRET ELECTRICAL COMPONENTS (PARA 3-56) for el tachometer.
		b-4. Replace az and/or el buffer amplifiers, see REPAIR OF TURRET ELECTRICAL COMPONENTS (PARA 3-56).
	c. Turret drifts in az or el.	c-1. Perform CHECKOUT OF INTERFACE CONTROL UNIT (PARA 3-39).
		c-2. Perform CHECKOUT OF TURRET CONTROL UNIT (PARA 3-36).
		c-3. Replace az and/or el buffer amplifiers, see REPAIR OF TURRET ELECTRICAL COMPONENTS (PARA 3-56).
	d. Turret not energized.	d. Continue test.

3-25. FIXED FORWARD TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
10. ON TEST SET, PRESS A, 1, AND RUN KEYS.		
PASS Indicator on test set lights.	FAIL indicator on test set lights.	Record all fault codes using NEXT LINE key. Perform corrective action as described in fault code data.
11. ON PILOT ARMAMENT CONTROL PANEL, SET WPN CONTR TO GUNNER AND MASTER ARM TO OFF.		
12. REMOVE POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7 AND DISCONNECT TEST SET.		

FIXED FORWARD TEST — FAULT CODE DATA

Fault Code	Corrective Action	Reference
1100	Perform CHECKOUT OF PILOT ARMAMENT CONTROL PANEL.	PARA 3-38
1101	Perform CHECKOUT OF LOGIC RELAY ASSEMBLY.	PARA 3-40.1
1102	1. Perform CHECKOUT OF PILOT ARMAMENT CONTROL PANEL.	PARA 3-38
	2. Perform CHECKOUT OF GUNNER ARMAMENT CONTROL PANEL.	PARA 3-37
1103	Perform CHECKOUT OF PILOT ARMAMENT CONTROL PANEL.	PARA 3-38
1104	1. Perform CHECKOUT OF GUN CONTROL UNIT.	PARA 3-35
	2. Perform CHECKOUT OF LOGIC RELAY ASSEMBLY.	PARA 3-40.1

FIXED FORWARD TEST — FAULT CODE DATA (cont)

Fault Code	Corrective Action	Reference
1105	Perform CHECKOUT OF GUN CONTROL UNIT.	PARA 3-35
1106	Perform CHECKOUT OF GUN CONTROL UNIT.	PARA 3-35
1107	Perform CHECKOUT OF GUN CONTROL UNIT.	PARA 3-35
1108	Perform CHECKOUT OF GUN CONTROL UNIT.	PARA 3-35
1111	1. Perform CHECKOUT OF LOGIC CONTROL UNIT.	PARA 3-34
	2. Perform CHECKOUT OF GUN CONTROL UNIT.	PARA 3-35
1112	Perform CHECKOUT OF LOGIC CONTROL UNIT.	PARA 3-34
1113	Perform CHECKOUT OF LOGIC CONTROL UNIT.	PARA 3-34
1114	1. Perform CHECKOUT OF LOGIC CONTROL UNIT.	PARA 3-34
	2. Perform TSU CONTROL OF TURRET TEST.	PARA 3-19
1115	1. Perform CHECKOUT OF TURRET CONTROL UNIT.	PARA 3-36
	2. Perform TSU CONTROL OF TURRET TEST.	PARA 3-19
1116	1. Perform CHECKOUT OF LOGIC CONTROL UNIT.	PARA 3-34
	2. Perform TSU CONTROL OF TURRET TEST.	PARA 3-19
1117	1. Perform CHECKOUT OF TURRET CONTROL UNIT.	PARA 3-36
	2. Perform TSU CONTROL OF TURRET TEST.	PARA 3-19
1118	Perform CHECKOUT OF LOGIC CONTROL UNIT.	PARA 3-34
1121	1. Perform CHECKOUT OF TURRET CONTROL UNIT.	PARA 3-36
	2. Perform CHECKOUT OF LOGIC CONTROL UNIT.	PARA 3-34
	3. Perform CHECKOUT OF GUNNER ARMAMENT CONTROL PANEL.	PARA 3-37
1122	Perform CHECKOUT OF LOGIC CONTROL UNIT.	PARA 3-34

3-25. FIXED FORWARD TEST (cont)

Fault Code	Corrective Action	Reference
1123	1. Perform CHECKOUT OF LOGIC CONTROL UNIT.	PARA 3-34
	2. Perform CHECKOUT OF TURRET CONTROL UNIT.	PARA 3-36
	3. Perform CHECKOUT OF GUNNER ARMAMENT CONTROL PANEL.	PARA 3-37
1124	1. Perform CHECKOUT OF LOGIC CONTROL UNIT.	PARA 3-34
	2. Perform CHECKOUT OF TURRET CONTROL UNIT.	PARA 3-36
	3. Perform CHECKOUT OF GUNNER ARMAMENT CONTROL PANEL.	PARA 3-37
1131	1. Perform CHECKOUT OF EMERGENCY STOW CONTROL UNIT.	PARA 3-33
	2. Perform CHECKOUT OF TURRET CONTROL UNIT.	PARA 3-36
1132	1. If fault code 1143 appears, perform its corrective action first.	
	2. Perform CHECKOUT OF GUNNER ARMAMENT CONTROL UNIT.	PARA 3-37
	3. Replace elevation proximity switches, see REPAIR OF TURRET ELECTRICAL COMPONENTS.	PARA 3-56
1133	1. Perform CHECKOUT OF GUNNER ARMAMENT CONTROL UNIT.	PARA 3-37
	2. Replace elevation proximity switches, see REPAIR OF TURRET ELECTRICAL COMPONENTS.	PARA 3-56
1141	1. Perform CHECKOUT OF GUNNER ARMAMENT CONTROL UNIT.	PARA 3-37
	2. Replace azimuth proximity switches, notify next higher level of maintenance.	
1142	1. Perform CHECKOUT OF GUNNER ARMAMENT CONTROL UNIT.	PARA 3-37
	2. Replace azimuth proximity switches, notify next higher level of maintenance.	
1143	1. Perform CHECKOUT OF TURRET CONTROL UNIT.	PARA 3-36
	2. Perform CHECKOUT OF GUNNER ARMAMENT CONTROL UNIT.	PARA 3-37
1144	1. Check fuses in interface control unit.	
	2. Perform CHECKOUT OF INTERFACE CONTROL UNIT.	PARA 3-39

FIXED FORWARD TEST — FAULT CODE DATA (cont)

Fault Code	Corrective Action	Reference
1145	1. Check fuses in interface control unit.	
	2. Perform CHECKOUT OF INTERFACE CONTROL UNIT.	PARA 3-39
1150	1. Perform CHECKOUT OF GUNNER ARMAMENT CONTROL UNIT.	PARA 3-37
	2. Check turret power overload sensor. See TM 55-1520-236-23.	
1151	1. Perform CHECKOUT OF TURRET CONTROL UNIT.	PARA 3-36
	2. Perform CHECKOUT OF EMERGENCY STOW CONTROL UNIT.	PARA 3-33
1152	Perform CHECKOUT OF TURRET CONTROL UNIT.	PARA 3-36
1153	Perform CHECKOUT OF TURRET CONTROL UNIT.	PARA 3-36
1154	Perform CHECKOUT OF TURRET CONTROL UNIT.	PARA 3-36
1155	1. Perform CHECKOUT OF LOGIC CONTROL UNIT.	PARA 3-34
	2. Perform CHECKOUT OF GUNNER ARMAMENT CONTROL UNIT.	PARA 3-37
1156	Perform CHECKOUT OF LOGIC CONTROL UNIT.	PARA 3-34
1157	Perform CHECKOUT OF LOGIC CONTROL UNIT.	PARA 3-34
1161	1. Perform CHECKOUT OF LOGIC CONTROL UNIT.	PARA 3-34
	2. Perform CHECKOUT OF GUNNER ARMAMENT CONTROL UNIT.	PARA 3-37
1162	Perform CHECKOUT OF GUNNER ARMAMENT CONTROL UNIT.	PARA 3-37

END OF TEST

3-26. GUN FUNCTION TEST

DESCRIPTION

This test covers: Checkout of gun functions and fault code data.

INITIAL SETUP

Tools/Test and Support Equipment:
- Tool Set, A/C Armament Repairman: Basic
- Tool Set, A/C Armament Repairman: Supplemental
- Electronics Systems Test Set: M137

References:
- TM 9-4933-224-13&P
- TM 55-1520-236-23

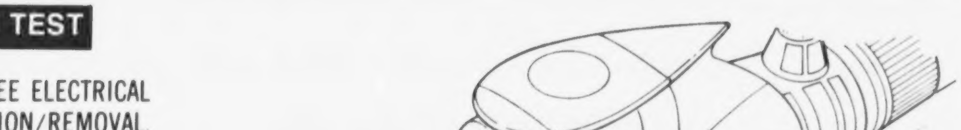
Personnel Required:

68J Aircraft Fire Control Repairer

Equipment Conditions:
- HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SET-UP performed, para 2-6.
- Test set cables W1 and W6 connected, see TEST SET CABLE CONNECTIONS, para 3-17.
- RD RMNG indicator on GACP set to 250.

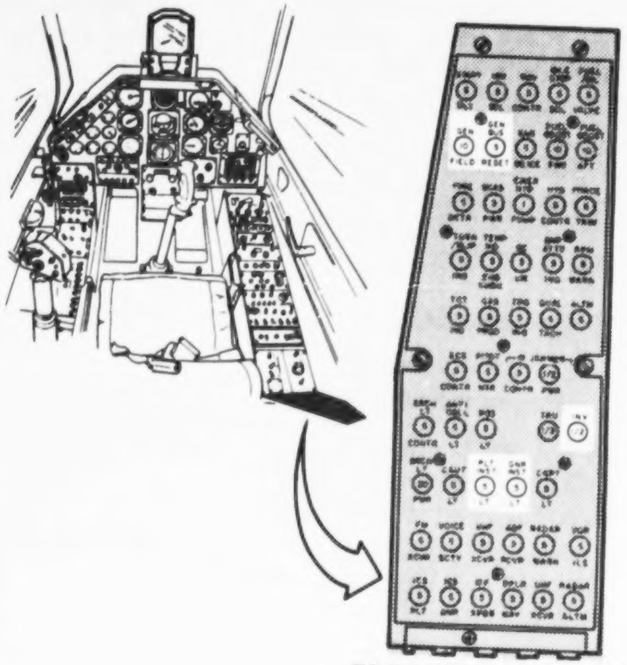
GUN FUNCTION TEST

1. APPLY POWER. SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.



GUN FUNCTION TEST (cont)

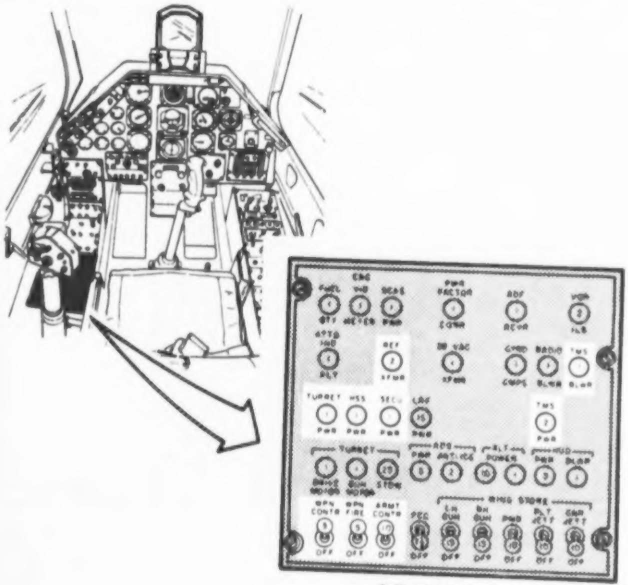
2. CLOSE FOLLOWING CIRCUIT BREAKERS ON DC CIRCUIT BREAKER PANEL:
   - GEN FIELD
   - GEN BUS RESET
   - INV
   - PLT INST LT
   - GNR INST LT



DC CIRCUIT BREAKER PANEL

ARR82 26719

3. CLOSE FOLLOWING CIRCUIT BREAKERS ON AC/ARMAMENT CIRCUIT BREAKER PANEL:
   - REF XFMR
   - TMS BLWR
   - TURRET PWR
   - HSS PWR
   - SECU PWR
   - TMS PWR
   - WPN CONTR
   - WPN FIRE
   - ARMT CONTR



AC / ARMAMENT CIRCUIT BREAKER PANEL

ARR82 26720

3-26. GUN FUNCTION TEST (cont)

GUN FUNCTION TEST (cont)

4. ON PILOT ARMAMENT CONTROL PANEL, CHECK THAT MASTER ARM SWITCH IS OFF.

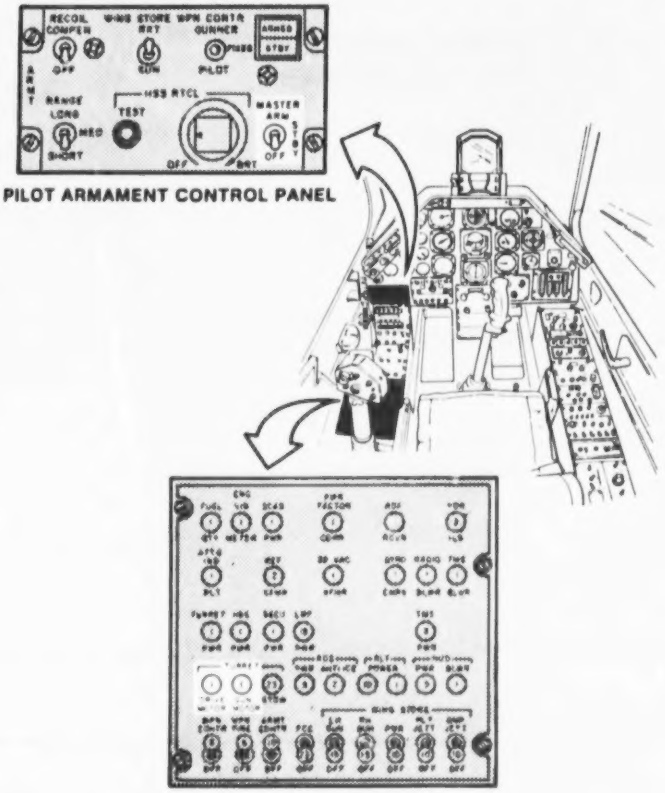
5. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, CHECK THAT TURRET DRIVE MOTOR AND GUN MOTOR CIRCUIT BREAKERS ARE OPEN.

WARNING

Do not put hands between lower support and saddle, personal injury could result.

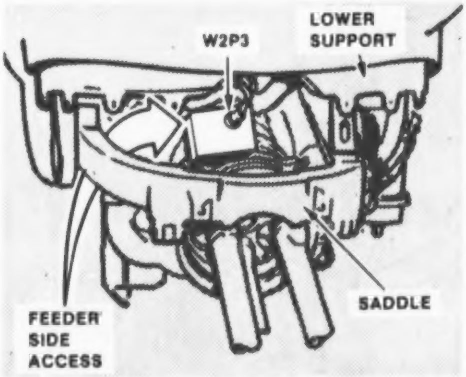
6. DISCONNECT FIRE VOLTS CABLE W2P3 FROM M197 GUN AND RECONNECT CABLE TO FIRING SIMULATOR ASSEMBLY. WORK FROM FEEDER SIDE ACCESS.

7. CHECK THAT TURRET SYSTEM CABLE W2P1 IS CONNECTED TO W3J1.

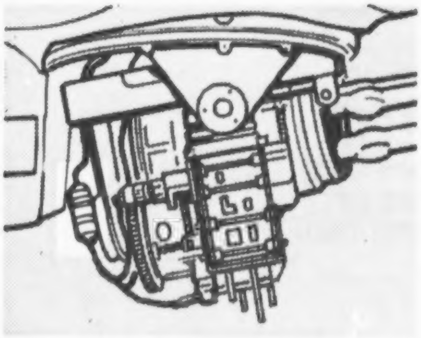

RECOIL COMPEN
WING STORE RKT
WPN CONTR GUNNER
ARMED
STBY
OFF
GUN
PILOT
ARMT
RANGE
LONG
MED
SHORT
TEST
HSS RTCL
MASTER ARM
STBY
OFF
OFF
BRT

PILOT ARMAMENT CONTROL PANEL

AC / ARMAMENT
CIRCUIT BREAKER PANEL


W2P3
LOWER SUPPORT
SADDLE
FEEDER SIDE ACCESS

FIRING SIMULATOR
ASSEMBLY



W2P1 AND W3J1

ARR82 26721

GUN FUNCTION TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
8. ON TEST SET, SET AC AND DC CIRCUIT BREAKER TO ON.		
a. AC and DC POWER indicators light.	a. Indicators not lighted.	a. Check TURRET PWR and WPN CONTR circuit breakers are closed.
b. 8's appear in REFERENCE and CODE displays.	b. Not all 8's in REFERENCE and CODE displays.	b. See TM 9-4933-224-13&P.
c. PASS indicator on test set lights.	c. FAIL indicator on test set lights.	c. See TM 9-4933-224-13&P.
9. ON TEST SET, PRESS RUN KEY.		
1000 in REFERENCE display.	1000 not in REFERENCE display.	Check cables, see TM 9-4933-224-13&P.
10. ON PILOT ARMAMENT CONTROL PANEL, SET WPN CONTR SWITCH TO FIXED AND MASTER ARM SWITCH TO ARM.		
11. ON AC/ARMAMENT CONTROL PANEL, CLOSE TURRET DRIVE MOTOR AND TURRET GUN MOTOR CIRCUIT BREAKERS.		
a. Turret moves to 0° az, 0° el position.	a. Turret does not move to 0° az, 0° el position.	a. Perform FIXED FORWARD TEST. (PARA 3-25).
b. Armed indicators on pilot armament control panel and gunner armament control panel light.	b. Indicators not lighted.	b-1. Perform CHECKOUT OF PILOT ARMAMENT CONTROL PANEL. (PARA 3-38). b-2. Perform CHECKOUT OF GUNNER ARMAMENT CONTROL PANEL. (PARA 3-37).
c. PLT IN CONT indicator on gunner armament control panel lights.	c. Indicator not lighted.	c. Perform CHECKOUT OF GUNNER ARMAMENT CONTROL PANEL. (PARA 3-37).

3-26. GUN FUNCTION TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
12. ON PILOT CYCLIC STICK, PRESS AND HOLD ACTION AND TRIGGER SWITCHES FOR 5 TO 10 SECONDS.		
a. M197 gun rotates.	a. M197 gun does not rotate.	a-1. Check gun drive shear pins. Notify next higher level of maintenance. a-2. Manually engage feeder solenoid and manually rotate M197 gun to check for obstructions. a-3. Replace gun drive. See REMOVAL/INSTALLATION OF GUN DRIVE.(PARA 3-53). a-4. Check gun drive relay. See TM 55-1520-236-23. a-5. Check trigger switch. See TM 55-1520-236-23.
b. Booster sprocket rotates.	b. Booster sprocket does not rotate.	b. Momentarily press jog switch in ammo bay. 1. If booster sprocket turns, check cyclic stick, see TM 55-1520-236-23. 2. If booster sprocket does not turn, check booster relay and/or replace booster motor. See REPAIR OF BOOSTER.(PARA 3-62).
c. Feeder solenoid energizes.	c. Feeder solenoid does not energize.	c-1. Perform CHECKOUT OF GUN CONTROL UNIT.(PARA 3-35). c-2. Replace feeder solenoid. See REPAIR OF M89E1 FEEDER.(PARA 3-42).
d. RD RMNG indicator on gunner armament control panel reads less than 250 if booster rotates.	d. RD RMNG indicator still reads 250.	d-1. Perform CHECKOUT OF GUNNER ARMAMENT CONTROL PANEL.(PARA 3-37). d-2. Check gap of round sensor switch. See REPAIR OF M89E1 FEEDER. (PARA 3-42). d-3. Replace round sensor switch. See REPAIR OF M89E1 FEEDER.(PARA 3-42).

GUN FUNCTION TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
NOTE **Trigger and action switch must be depressed within 15 seconds of pressing RUN key.** 13. ON TEST SET, PRESS A, 7, AND RUN KEYS. THEN PRESS AND HOLD PILOT CYCLIC STICK ACTION AND TRIGGER SWITCHES FOR 5 TO 10 SECONDS.		
PASS indicator on test set lights.	FAIL indicator on test set lights.	Record all fault codes using NEXT LINE key. Perform corrective action as described in fault code data.
14. ON TEST SET, PRESS A AND 8 KEYS. 15. PRESS AND HOLD PILOT CYCLIC STICK ACTION AND TRIGGER SWITCHES. 16. ON TEST SET, PRESS RUN KEY. 17. RELEASE PILOT CYCLIC STICK ACTION AND TRIGGER SWITCHES.		
PASS indicator on test set lights.	FAIL indicator on test set lights.	Record all fault codes using NEXT LINE key. Perform corrective action as described in fault code data.

3-26. GUN FUNCTION TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
18. PRESS AND HOLD PILOT CYCLIC STICK ACTION SWITCH AND TRIGGER SWITCH TO THE FIRST DETENT.		
M197 gun rotates for approximately two seconds, then stops.	a. M197 gun does not rotate.	a-1. Perform CHECKOUT OF GUN CONTROL UNIT.(PARA 3-35).
		a-2. Check trigger switch, see TM 55-1520-236-23.
	b. M197 gun does not stop after approximately two seconds.	b-1. Perform CHECKOUT OF GUN CONTROL UNIT.(PARA 3-35).
		b-2. Check trigger switch, see TM 55-1520-236-23.
19. RELEASE ACTION AND TRIGGER SWITCHES.		
20. ON PILOT ARMAMENT CONTROL PANEL, SET WPN CONTR SWITCH TO GUNNER AND MASTER ARM SWITCH TO OFF.		

GUN FUNCTION TEST (cont)

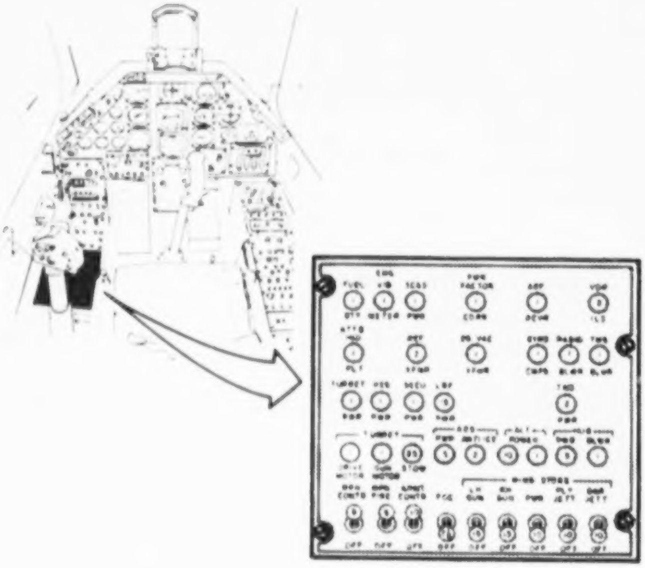
21. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, OPEN TURRET DRIVE MOTOR CIRCUIT BREAKER.

WARNING

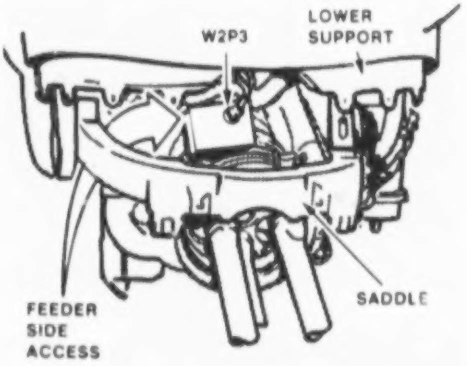
Do not put hands between lower support and saddle, personal injury could result.

22. DISCONNECT FIRE VOLTS CABLE W2P3 FROM FIRING SIMULATOR ASSEMBLY AND RECONNECT CABLE TO M197 GUN. WORK FROM FEEDER SIDE ACCESS.

23. REMOVE POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7, AND DISCONNECT TEST SET.



AC / ARMAMENT CIRCUIT BREAKER PANEL



FIRING SIMULATOR ASSEMBLY

ARR82 26722

3-26. GUN FUNCTION TEST (cont)

GUN FUNCTION TEST — FAULT CODE DATA

Fault Code	Corrective Action	Reference Paragraph
1381	Perform CHECKOUT OF PILOT ARMAMENT CONTROL PANEL.	3-38
1382	Perform CHECKOUT OF PILOT ARMAMENT CONTROL PANEL.	3-38
1383	Perform CHECKOUT OF PILOT ARMAMENT CONTROL PANEL.	3-38
1384	Perform FIXED FORWARD TEST.	3-25
1385	1. Perform CHECKOUT OF LOGIC RELAY ASSEMBLY.	3-40.1
	2. Check pilot cyclic stick action and trigger switches, see TM 55-1520-236-23.	
1391	1. Perform CHECKOUT OF GUN CONTROL UNIT.	3-35
	2. Perform FIXED FORWARD TEST.	3-25
1392	Perform CHECKOUT OF GUN CONTROL UNIT.	3-35
1393	Perform CHECKOUT OF GUN CONTROL UNIT.	3-35
1394	Perform CHECKOUT OF LOGIC CONTROL UNIT.	3-34
1395	Perform CHECKOUT OF GUN CONTROL UNIT.	3-35
1410	1. Perform CHECKOUT OF GUN CONTROL UNIT.	3-35
	2. Check turret cable W2 for broken fire volts wire.	
1411	Perform CHECKOUT OF LOGIC CONTROL UNIT.	3-34
1430	Check pilot cyclic stick trigger switch, see TM 55-1520-236-23.	
1431	Perform CHECKOUT OF GUN CONTROL UNIT.	3-35
1432	1. Perform CHECKOUT OF GUN CONTROL UNIT.	3-35
	2. Replace feeder solenoid, see REPAIR OF M89E1 FEEDER.	3-42
1433	Perform CHECKOUT OF GUN CONTROL UNIT.	

GUN FUNCTION TEST — FAULT CODE DATA (cont)

Fault Code	Corrective Action	Reference Paragraph
1434	Perform CHECKOUT OF GUN CONTROL UNIT.	3-35
1441	Perform CHECKOUT OF GUN CONTROL UNIT.	3-35
1442	Perform CHECKOUT OF GUN CONTROL UNIT.	3-35
1451	Perform CHECKOUT OF GUN CONTROL UNIT.	3-35
1452	Perform CHECKOUT OF LOGIC CONTROL UNIT.	3-34

END OF TEST

3-27. TSU RANGE COMPENSATION TEST

DESCRIPTION

This test covers: Checkout of range compensation function of TSU and turret.

INITIAL SETUP

Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental

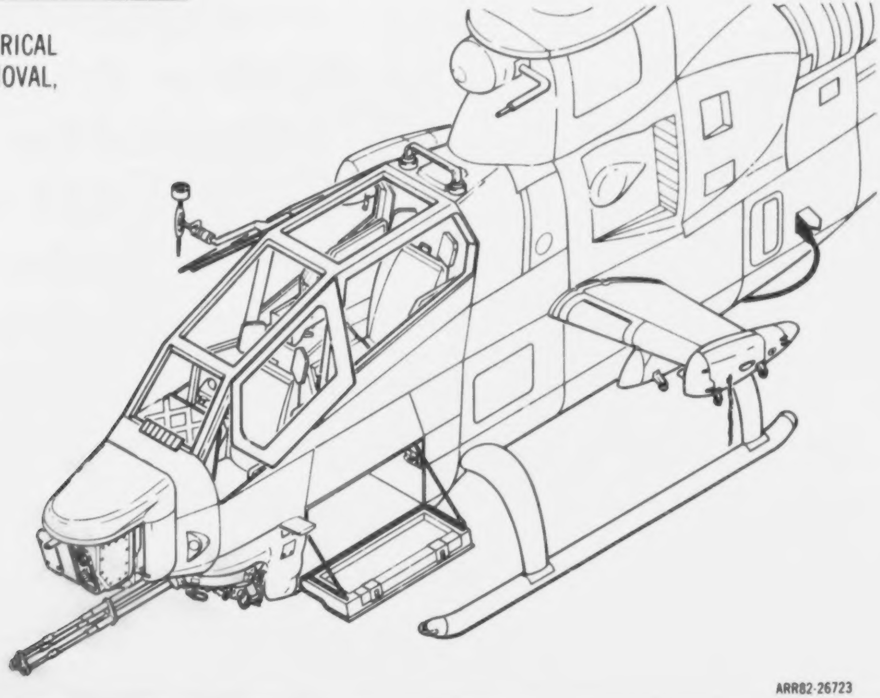
References:
  TM 55-1520-236-23

Personnel Required: (3)
  68J Aircraft Fire Control Repairer/
  68M Aircraft Weapon Systems Repairer

Equipment Conditions:
  HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP performed, para 2-6.
  TSU window cover removed.

TSU RANGE COMPENSATION TEST

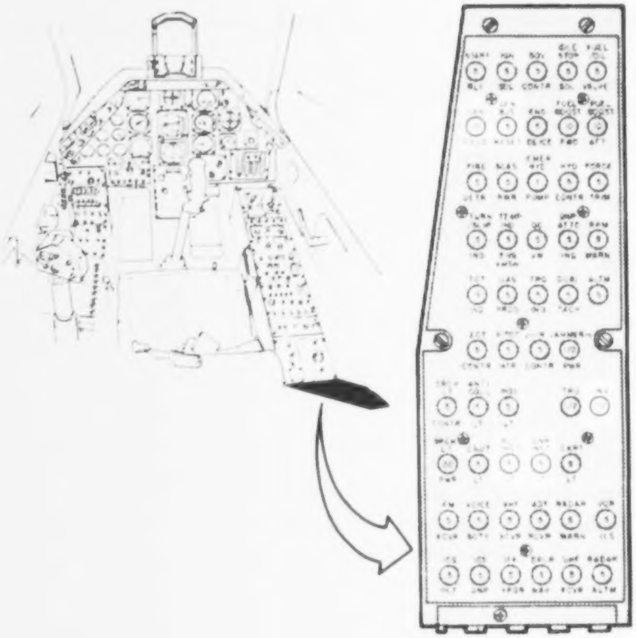
1. APPLY POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.



ARR82-26723

TSU RANGE COMPENSATION TEST (cont)

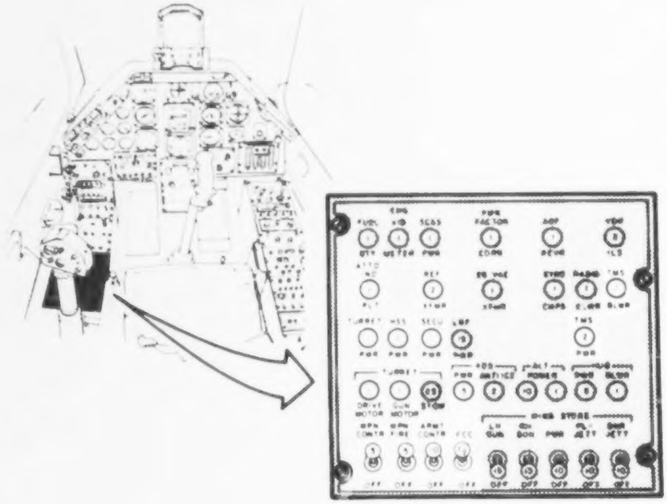
2. CLOSE FOLLOWING CIRCUIT BREAKERS ON DC CIRCUIT BREAKER PANEL:
   - GEN FIELD
   - GEN BUS RESET
   - INV
   - PLT INST LT
   - GNR INST LT



DC CIRCUIT BREAKER PANEL

APR82-26724

3. CLOSE FOLLOWING CIRCUIT BREAKERS ON AC/ARMAMENT CIRCUIT BREAKER PANEL:
   - ATTD IND PLT
   - REF XFMR
   - TMS BLWR
   - TURRET PWR
   - HSS PWR
   - SECU PWR
   - TMS PWR
   - TURRET DRIVE MOTOR
   - TURRET GUN MOTOR
   - ADS PWR
   - WPN CONTR
   - WPN FIRE
   - ARMT CONTR
   - FCC



AC / ARMAMENT
CIRCUIT BREAKER PANEL

APR82-26725

3-27. TSU RANGE COMPENSATION TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
4. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO STBY.		
5. ON TOW CONTROL PANEL, SET MODE SELECT SWITCH TO TSU/GUN.		
6. ON SHC, SET ACQ/TRK/STOW SWITCH TO TRK.		

NOTE

The TSU LOS must be maintained at a steady 0° az 0° el position. This can be better accomplished by placing HI/LO MAG switch to HI and sighting on a distant target.

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
7. POSITION TSU LOS TO 0° AZ 0° EL, PRESS AND HOLD LHG ACTION SWITCH.		
Turret alines with TSU LOS.	Turret does not aline with TSU LOS.	1. Perform TSU CONTROL OF TURRET TEST.(PARA 3-19). 2. Perform CHECKOUT OF GUNNER ARMAMENT CONTROL PANEL. (PARA 3-37).
8. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO ARM.		
Turret elevation increases approximately 9 mils (0.50 inch (12.70 mm) measured at end of gun barrels).	Turret elevation does not change or slews to an incorrect position.	**Test FCC, see TM 55-1520-236-23 and TM 9-1270-218-13&P.**

TSU RANGE COMPENSATION TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
NOTE **RANGE switch must be switched by third person.**		
9. ON GUNNER ARMAMENT CONTROL PANEL, SET RANGE SWITCH TO MED.		
Turret elevation shall increase to approximately 25 mils (1 inch (25.40 mm) measured at end of gun barrels).	Turret elevation does not increase.	1. Perform CHECKOUT OF GUNNER ARMAMENT CONTROL PANEL. (PARA 3-37). **2. Test FCC, see TM 55-1520-236-23 and TM 9-1270-218-13&P.**
10. ON GUNNER ARMAMENT CONTROL PANEL, SET RANGE SWITCH TO LONG.		
Turret elevation shall increase to approximately 43 mils (2.50 inches (63.50 mm) measured at end of gun barrels).	Turret elevation does not increase.	1. Perform CHECKOUT OF GUNNER ARMAMENT CONTROL PANEL. (PARA 3-37). **2. Test FCC, see TM 55-1520-236-23 and TM 9-1270-218-13&P.**
11. RELEASE LHG ACTION SWITCH.		
12. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO STBY.		
13. ON GUNNER ARMAMENT CONTROL PANEL, SET RANGE SWITCH TO SHORT.		
14. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, OPEN FCC CIRCUIT BREAKER.		
15. ON TOW CONTROL PANEL, SET MODE SELECT SWITCH TO OFF.		
16. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO OFF.		

3-27. TSU RANGE COMPENSATION TEST (cont)

TSU RANGE COMPENSATION TEST (cont)

17. REMOVE POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.

END OF TEST

3-28. SCAS TEST

DESCRIPTION

This test covers: Checkout of SCAS voltages with test set.

INITIAL SETUP

Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental
  Electronics Systems Test
    Set: M137

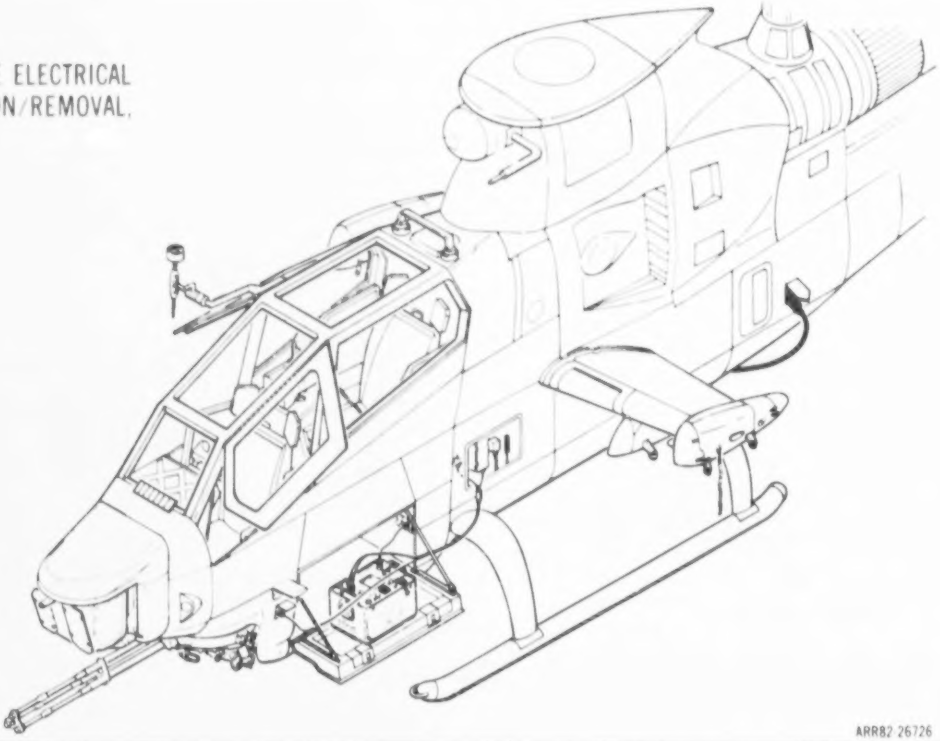
References:
  TM 9-4933-224-13&P

Personnel Required:
  68J Aircraft Fire Control
    Repairer (2)

Equipment Conditions:
  HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP performed, para 2-6.
  Test set cables W1 and W6 connected, see TEST SET CABLE CONNECTIONS, para 3-17.

SCAS TEST

1. APPLY POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.

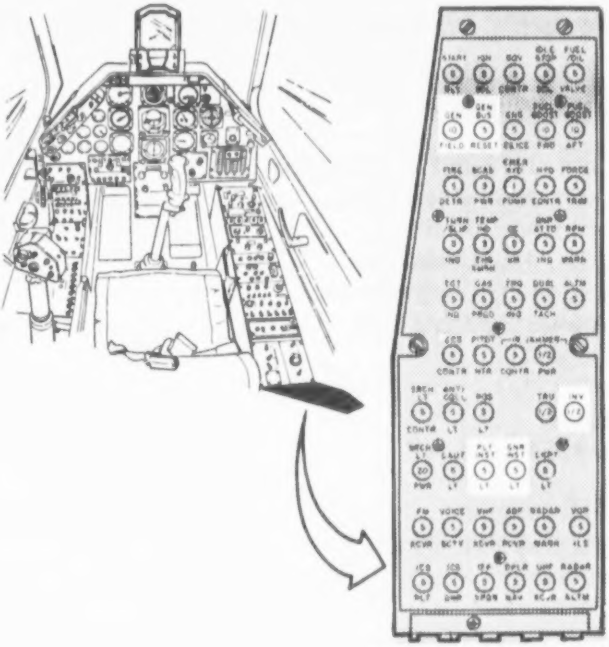


ARR82-26726

3-28. SCAS TEST (cont)

SCAS TEST (cont)

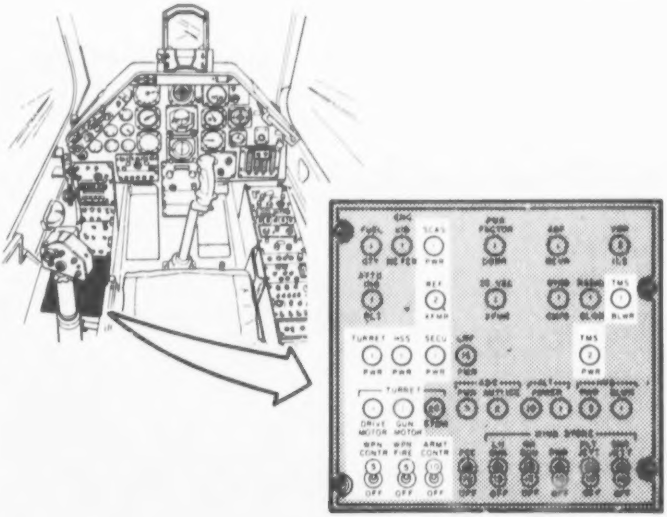
2. CLOSE FOLLOWING CIRCUIT BREAKERS ON DC CIRCUIT BREAKER PANEL:
   - GEN FIELD
   - GEN BUS RESET
   - INV
   - PLT INST LT
   - GNR INST LT


START
FUEL /OIL VALVE
GEN FIELD
GEN BUS RESET
FORCE TRIM
TURN /SLIP IND
ATTD IND
RPM WARN
PITOT HTR
TRU
INV
PLT INST LT
GNR INST LT
VOICE SCTY
RADAR WARN
RADAR ALTM

DC CIRCUIT BREAKER PANEL

ARR82-26727

3. CLOSE FOLLOWING CIRCUIT BREAKERS ON AC/ARMAMENT CIRCUIT BREAKER PANEL:
   - SCAS PWR
   - REF XFMR
   - TMS BLWR
   - TURRET PWR
   - HSS PWR
   - SECU PWR
   - TMS PWR
   - TURRET DRIVE MOTOR
   - TURRET GUN MOTOR
   - WPN CONTR
   - WPN FIRE
   - ARMT CONTR


SCAS PWR
PWR FACTOR
REF XFMR
TMS BLWR
TURRET PWR
HSS PWR
SECU PWR
TMS PWR
TURRET
DRIVE MOTOR
GUN MOTOR
WPN CONTR
WPN FIRE
ARMT CONTR
OFF
OFF
OFF

AC / ARMAMENT CIRCUIT BREAKER PANEL

ARR82-26728

SCAS TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
4. ON TEST SET, SET AC AND DC CIRCUIT BREAKERS TO ON.		
a. AC and DC POWER indicators light.	a. Indicators not lighted.	a. Check that TURRET PWR and WPN CONTR circuit breakers are closed.
b. 8's appear in REFERENCE and CODE displays.	b. Not all 8's in REFERENCE and code displays.	b. See TM 9-4933-224-13&P
c. PASS indicator on test set lights.	c. FAIL indicator on test set lights.	c. See TM 9-4933-224-13&P.
5. ON TEST SET, PRESS RUN KEY.		
1000 in REFERENCE display.	1000 not in REFERENCE display.	Check cables, see TM 9-4933-224-13&P.
6. ON PILOT ARMAMENT CONTROL PANEL, SET WPN CONTR SWITCH TO FIXED FWD AND MASTER ARM SWITCH TO STBY.		
Turret moves to fixed forward.	Turret does not move to fixed forward.	Perform FIXED FORWARD TEST (PARA 3-25).
7. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, OPEN TURRET DRIVE MOTOR CIRCUIT BREAKER.		
8. ON TEST SET, PRESS 0, 8, AND RUN KEYS.		
REFERENCE display reads 0 ± 1.0.	REFERENCE display reads other than 0 ± 1.0.	Perform CHECKOUT OF LOGIC CONTROL UNIT (PARA 3-34).
9. ON TEST SET, PRESS 0, 9, AND RUN KEYS.		
REFERENCE display reads 0 ± 1.0.	REFERENCE display reads other than 0 ± 1.0.	Perform CHECKOUT OF LOGIC CONTROL UNIT (PARA 3-34).

3-28. SCAS TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
10. SET AZIMUTH DRIVE MOTOR BRAKE HANDLE TO UNLOCKED POSITION.		
11. MANUALLY SLEW TURRET TO RIGHT AZIMUTH LIMIT.		
12. ON TEST SET, PRESS 0, 8, AND RUN KEYS.		
REFERENCE display reads -4.5 ± 1.0.	REFERENCE display does not read -4.5 ± 1.0.	Perform CHECKOUT OF LOGIC CONTROL UNIT (PARA 3-34).
13. ON TEST SET, PRESS 0, 9, AND RUN KEYS.		
REFERENCE display reads -4.5 ± 1.0.	REFERENCE display does not read -4.5 ± 1.0.	Perform CHECKOUT OF LOGIC CONTROL UNIT (PARA 3-34).
14. MANUALLY SLEW TURRET TO LEFT AZIMUTH LIMIT.		
15. ON TEST SET, PRESS 0, 8, AND RUN KEYS.		
REFERENCE display reads + 4.5 ± 1.0.	REFERENCE display does not read + 4.5 ± 1.0.	Perform CHECKOUT OF LOGIC CONTROL UNIT (PARA 3-34).
16. ON TEST SET, PRESS 0, 9, AND RUN KEYS.		
REFERENCE display reads + 4.5 ± 1.0.	REFERENCE display does not read + 4.5 ± 1.0.	Perform CHECKOUT OF LOGIC CONTROL UNIT (PARA 3-34).
17. MANUALLY SLEW TURRET TO 0° AZ (TEST SET DISPLAY READS 0 ± 0.2).		
18. SET AZIMUTH DRIVE MOTOR BRAKE HANDLE TO LOCKED POSITION.		

SCAS TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
CAUTION **Make sure barrels are supported to prevent barrels from striking ground.**		
19. RELEASE ELEVATION DRIVE MOTOR BRAKE AND LOWER BARRELS ONTO SUITABLE PAD.		
20. ON TEST SET, PRESS 0, 7, AND RUN KEYS.		
REFERENCE display reads 0 ± 1.0.	REFERENCE display does not read 0 ± 1.0.	Perform CHECKOUT OF LOGIC CONTROL UNIT (PARA 3-34).
21. MANUALLY POSITION TURRET TO UP LIMIT AT 0° AZ.		
REFERENCE display reads 3.3 ± 1.0.	REFERENCE display does not read 3.3 ± 1.0.	Perform CHECKOUT OF LOGIC CONTROL UNIT (PARA 3-34).
22. MANUALLY POSITION TO 0° EL AND ENGAGE ELEVATION DRIVE MOTOR BRAKE HANDLE.		
23. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, CLOSE TURRET DRIVE MOTOR CIRCUIT BREAKER.		
24. ON PILOT ARMAMENT CONTROL PANEL, SET WPN CONTR SWITCH TO GUNNER AND MASTER ARM SWITCH TO OFF.		
25. REMOVE POWER, SEE ELECTRICAL POWER REMOVAL/APPLICATION, PARA 2-7, AND DISCONNECT TEST SET.		

END OF TEST

3-29. COINCIDENCE TEST

DESCRIPTION

This test covers: Checkout of coincidence circuits.

INITIAL SETUP

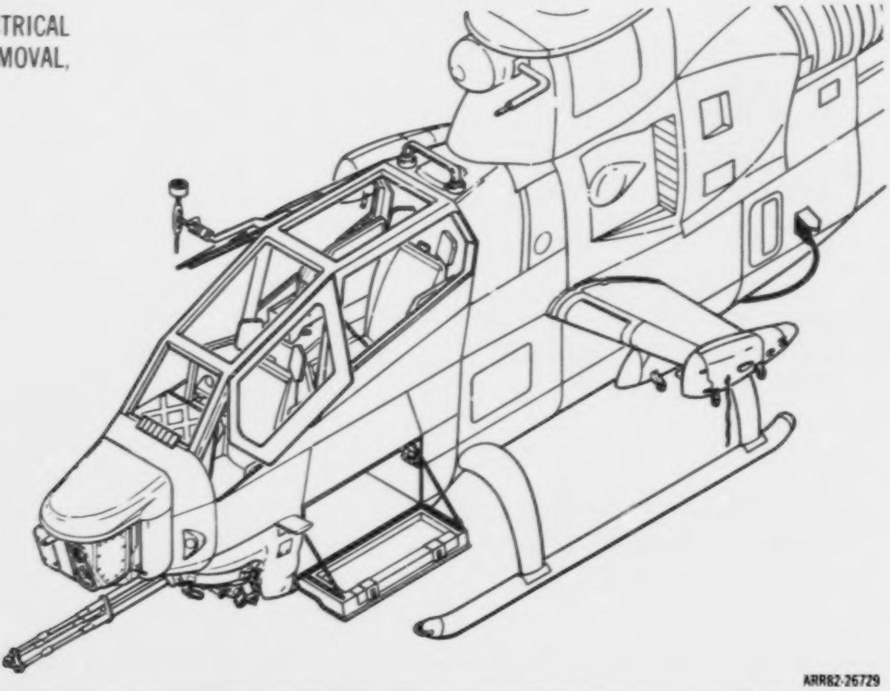
Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental

Personnel Required: (2)
  68J Aircraft Fire Control Repairer/
  68M Aircraft Weapon Systems Repairer

Equipment Conditions:
  HELICOPTER ARMAMENT SUB-SYSTEM MAINTENANCE SETUP performed, para 2-6.
  TSU window cover removed.

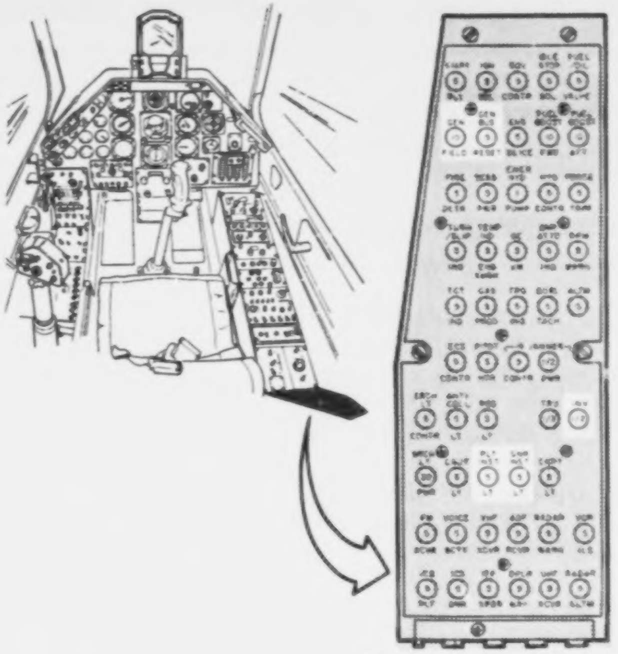
COINCIDENCE TEST

1. APPLY POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.



COINCIDENCE TEST (cont)

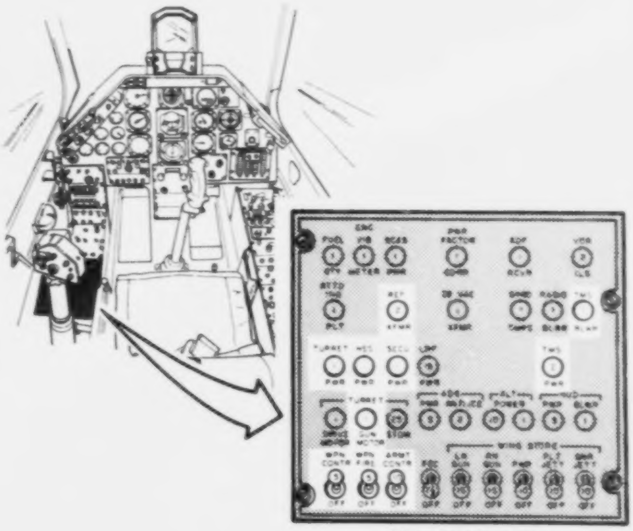
2. CLOSE FOLLOWING CIRCUIT BREAKERS ON DC CIRCUIT BREAKER PANEL:
    - GEN FIELD
    - GEN BUS RESET
    - INV
    - PLT INST LT
    - GNR INST LT



DC CIRCUIT BREAKER PANEL

ARR82-26730

3. CLOSE FOLLOWING CIRCUIT BREAKERS ON AC/ARMAMENT CIRCUIT BREAKER PANEL:
    - REF XFMR
    - TMS BLWR
    - TURRET PWR
    - HSS PWR
    - SECU PWR
    - TMS PWR
    - TURRET GUN MOTOR
    - WPN CONTR
    - WPN FIRE
    - ARMT CONTR


TURRET
WING STORE
WPN CONTR
WPN FIRE
ARMT CONTR
OFF

AC / ARMAMENT CIRCUIT BREAKER PANEL

ARR82-26731

best copy available

3-29. COINCIDENCE TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
4. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO ARM.		
5. ON TOW CONTROL PANEL, SET MODE SELECT SWITCH TO TSU/GUN.		
6. SET ELEVATION AND AZIMUTH DRIVE MOTOR BRAKE HANDLES TO UNLOCKED POSITION AND MANUALLY POSITION TURRET TO THE LEFT LIMIT AT APPROXIMATELY 0° EL.		
7. SET ELEVATION AND AZIMUTH DRIVE MOTOR BRAKE HANDLES TO LOCKED POSITION.		
8. ON SHC, SET ACQ/TRK/STOW SWITCH TO TRK.		
9. USING SHC STICK, POSITION TSU LOS TO APPROXIMATELY 90° RIGHT AZ 0° EL.		
10. PRESS LHG ACTION AND TRIGGER SWITCHES, THEN ENGAGE TURRET DRIVE MOTOR CIRCUIT BREAKER.		
a. Turret moves to aline with TSU.	a. Turret does not move.	a. Perform CHECKOUT OF LOGIC CONTROL UNIT (PARA 3-34).
b. TSU G battle flag flashes.	b. G battle flag does not flash.	b-1. Perform CHECKOUT OF LOGIC CONTROL UNIT (PARA 3-34). b-2. Perform CHECKOUT OF GUN CONTROL UNIT (PARA 3-35). b-3. Perform CHECKOUT OF INTERFACE CONTROL UNIT (PARA 3-39).
c. Turret alines with TSU and G battle flag on steady; M197 gun rotates.	c. M197 gun rotates before turret alines with TSU.	c-1. Perform CHECKOUT OF LOGIC CONTROL UNIT (PARA 3-34). c-2. Perform CHECKOUT OF GUN CONTROL UNIT (PARA 3-35).
11. RELEASE LHG TRIGGER AND ACTION SWITCHES.		

COINCIDENCE TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
12. ON SHC, SET ACQ/TRK/STOW SWITCH TO STOW.		
13. ON TOW CONTROL PANEL, SET MODE SELECT SWITCH TO OFF.		
14. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO OFF.		
15. REMOVE POWER, SEE ELECTRICAL POWER REMOVAL/APPLICATION, PARA 2-7.		

END OF TEST

3-30. EMERGENCY STOW TEST

DESCRIPTION

This test covers: Checkout of emergency stow function.

INITIAL SETUP

Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental

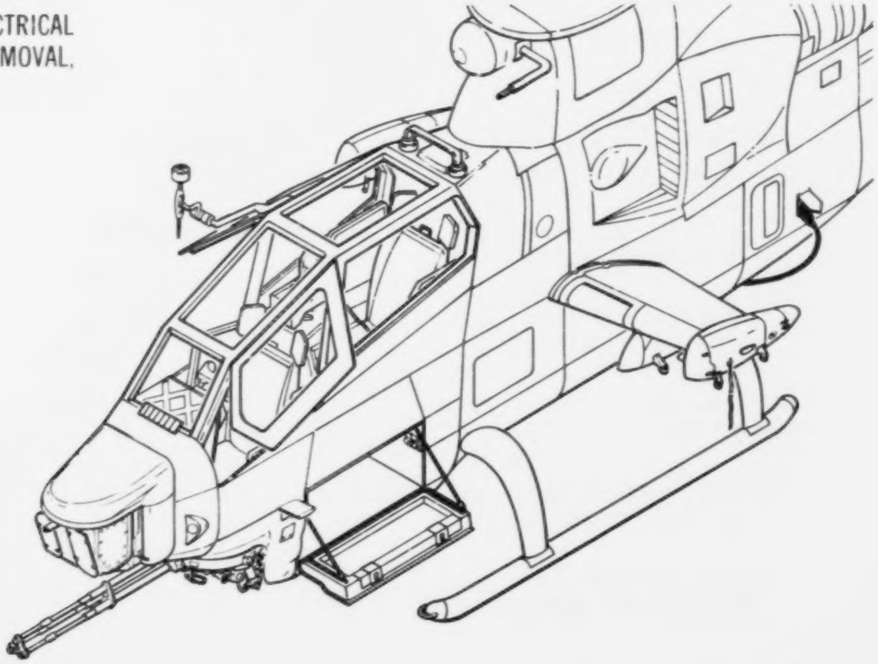
References:
  TM 55-1520-236-23

Personnel Required: (2)
  68J Aircraft Fire Control Repairer/
  68M Aircraft Weapon Systems Repairer

Equipment Conditions:
  HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP performed, para 2-6.

EMERGENCY STOW TEST

1. APPLY POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.

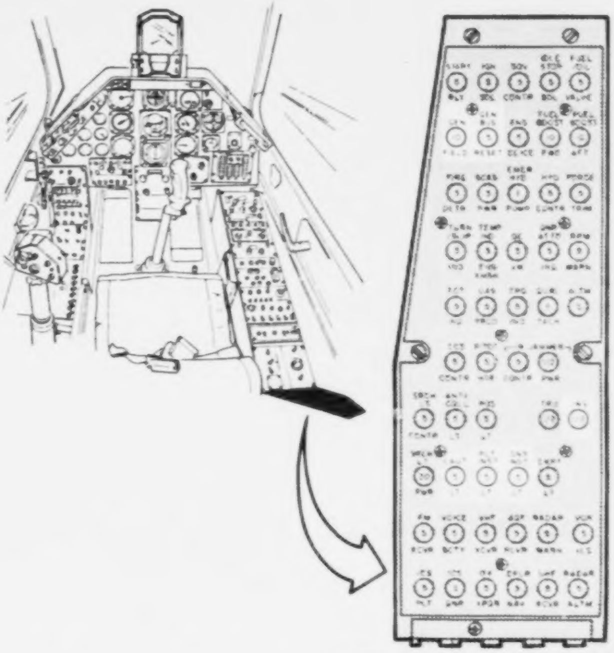


EMERGENCY STOW TEST (cont)

NOTE

Dim caution panels after closing CAUT LT circuit breaker.

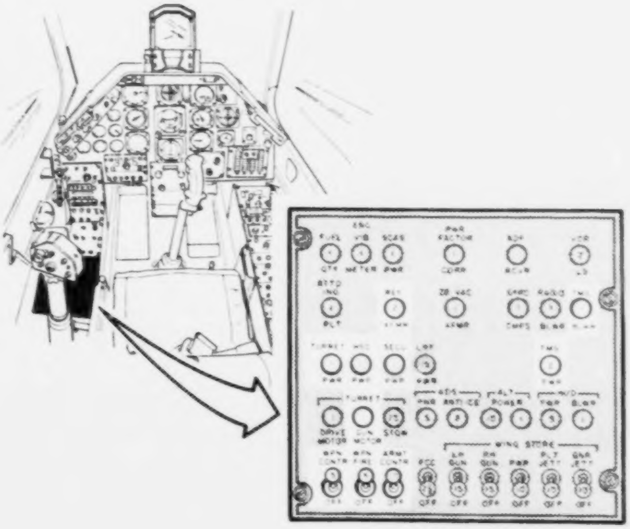
2. CLOSE FOLLOWING CIRCUIT BREAKERS ON DC CIRCUIT BREAKER PANEL:
   - GEN FIELD
   - GEN BUS RESET
   - INV
   - PLT INST LT
   - GNR INST LT
   - CAUT LT


GEN FIELD
GEN BUS RESET
ENG DEICE
FUEL BOOST FWD
FUEL BOOST AFT
FIRE DETR
SCAS PWR
EMER HYD PUMP
HYD CONTR
FORCE TRIM
RPM WARN
CAUT LT
PLT INST LT
GNR INST LT
FM RCVR
VOICE SCTY
UHF XCVR
ADF RCVR
RADAR WARN
VOR
UHF RCVR
RADAR ALTM

DC CIRCUIT BREAKER PANEL

ARR82 26733

3. CLOSE FOLLOWING CIRCUIT BREAKERS ON AC/ARMAMENT CIRCUIT BREAKER PANEL:
   - REF XFMR
   - TMS BLWR
   - TURRET PWR
   - HSS PWR
   - SECU PWR
   - TMS PWR
   - TURRET GUN MOTOR
   - WPN CONTR
   - WPN FIRE
   - ARMT CONTR


ENG VIB METER
SCAS PWR
PWR FACTOR CORR
ADF RCVR
28 VAC XFMR
RADIO BLWR
TURRET PWR
HSS PWR
SECU PWR
TMS PWR
TURRET
DRIVE MOTOR
GUN MOTOR
STOW
ALT POWER
WING STORE
WPN CONTR
WPN FIRE
ARMT CONTR
OFF

AC / ARMAMENT CIRCUIT BREAKER PANEL

ARR82 26734

3-30. EMERGENCY STOW TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
CAUTION **Make sure barrels are supported to prevent barrels from striking ground.**		
4. RELEASE ELEVATION AND AZIMUTH DRIVE MOTOR BRAKES.		
5. MANUALLY POSITION TURRET TO RIGHT MECHANICAL LIMIT AND MAXIMUM DEPRESSION ALLOWABLE. APPLY BOTH BRAKES.		
On pilot caution panel GUN ELEV STOWED indicator not lighted.	GUN ELEV STOWED indicator lighted.	1. Check elevation stow switch for stuck or damaged actuator. 2. Check aircraft wiring for short in stowed signal wiring to 28 Vdc source, see TM 55-1520-236-23.
CAUTION **Do not leave TURRET STOW circuit breaker closed for more than 10 seconds if turret fails to move to stow position.**		
6. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, CLOSE TURRET STOW CIRCUIT BREAKER.		
a. Turret moves to stow position.	a. Turret does not move to stow position.	a-1. Perform CHECKOUT OF EMERGENCY STOW CONTROL UNIT (PARA 3-33). a-2. Inform next higher level of maintenance to check stow switch operation.
b. GUN ELEV STOWED indicator lights.	b. GUN ELEV STOWED indicator not lighted.	b. Check wiring and bulb, see TM 55-1520-236-23.
7. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, OPEN TURRET STOW CIRCUIT BREAKER.		

EMERGENCY STOW TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
CAUTION **Make sure barrels are supported to prevent barrels from striking ground.**		
8. RELEASE ELEVATION AND AZIMUTH DRIVE MOTOR BRAKES.		
9. MANUALLY POSITION TURRET TO LEFT MECHANICAL LIMIT AND MAXIMUM. DEPRESSION ALLOWABLE. APPLY BOTH BRAKES.		
On pilot caution panel GUN ELEV STOWED indicator not lighted.	GUN ELEV STOWED indicator lighted.	1. Check elevation stow switch for stuck or damaged actuator. 2. Check aircraft wiring for short in stowed signal wiring to 28 Vdc source, see TM 55-1520-236-23.
CAUTION **Do not leave TURRET STOW circuit breaker closed for more than 10 seconds if turret fails to move to stow position.**		
10. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, CLOSE TURRET STOW CIRCUIT BREAKER.		
a. Turret moves to stow position.	a. Turret does not move to stow position.	a-1. Perform CHECKOUT OF EMERGENCY STOW CONTROL UNIT (PARA 3-33). a-2. Inform next higher level of maintenance to check stow switch operation.
b. GUN ELEV STOWED indicator lights.	b. GUN ELEV STOWED indicator not lighted.	b. Check wiring and bulb, see TM 55-1520-236-23.
11. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, OPEN TURRET STOW CIRCUIT BREAKER.		

3-30. EMERGENCY STOW TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
12. REMOVE POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.		

END OF TEST

3-31. AMMUNITION HANDLING TEST

DESCRIPTION

This test covers: Checkout of ammunition feed system.

INITIAL SETUP

Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental

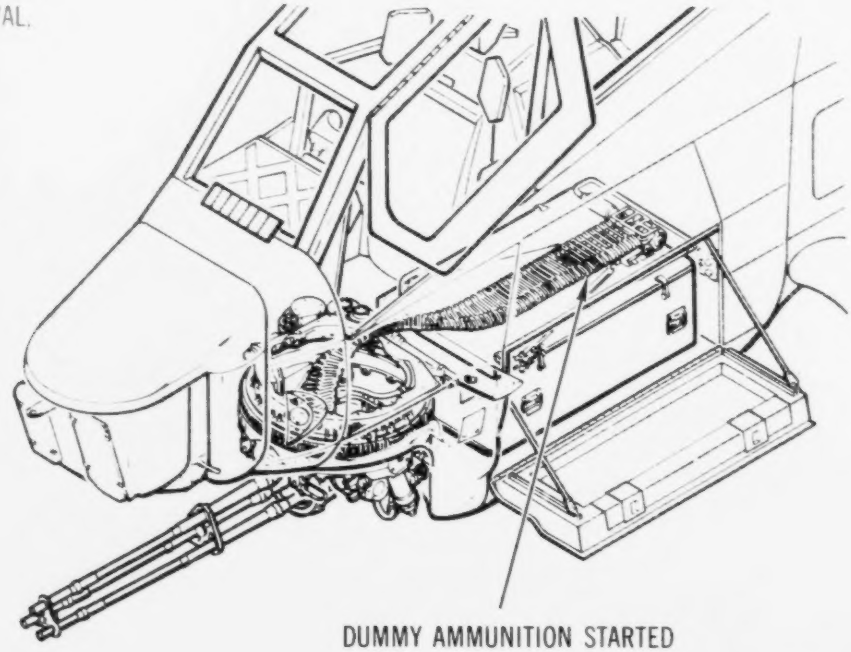
Personnel Required: (2)

68M Aircraft Weapon Systems Repairer

Equipment Conditions:
  100 rounds of linked dummy ammunition loaded in ammunition box and started in feed chute, see LOADING AMMUNITION, para 2-11.

AMMUNITION HANDLING TEST

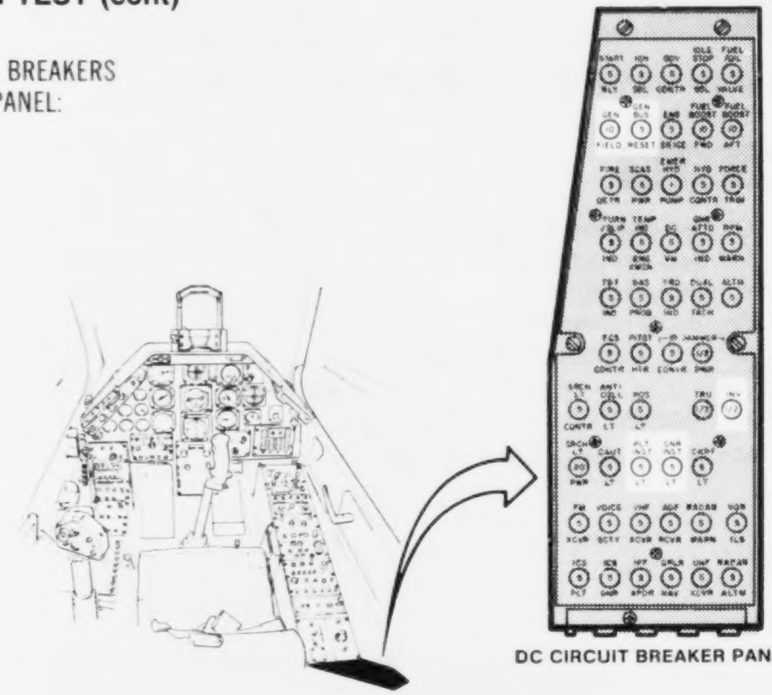
1. APPLY POWER. SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.



3-31. AMMUNITION HANDLING TEST (cont)

AMMUNITION HANDLING TEST (cont)

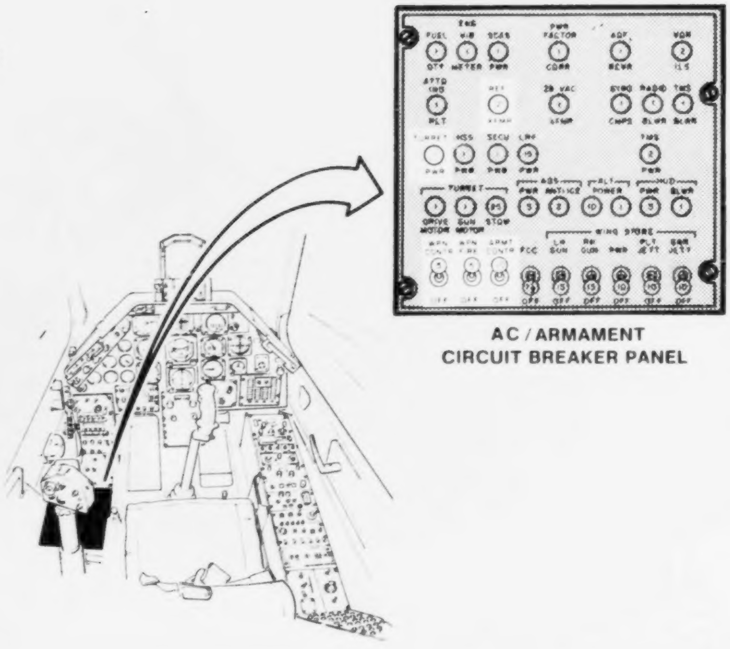
2. CLOSE FOLLOWING CIRCUIT BREAKERS ON DC CIRCUIT BREAKER PANEL:
   - GEN FIELD
   - GEN BUS RESET
   - INV
   - PLT INST LT
   - GNR INST LT



DC CIRCUIT BREAKER PANEL

ARR82-26736

3. CLOSE FOLLOWING CIRCUIT BREAKERS ON AC/ARMAMENT CIRCUIT BREAKER PANEL:
   - REF XFMR
   - TURRET PWR
   - WPN CONTR
   - WPN FIRE
   - ARMT CONTR



AC / ARMAMENT CIRCUIT BREAKER PANEL

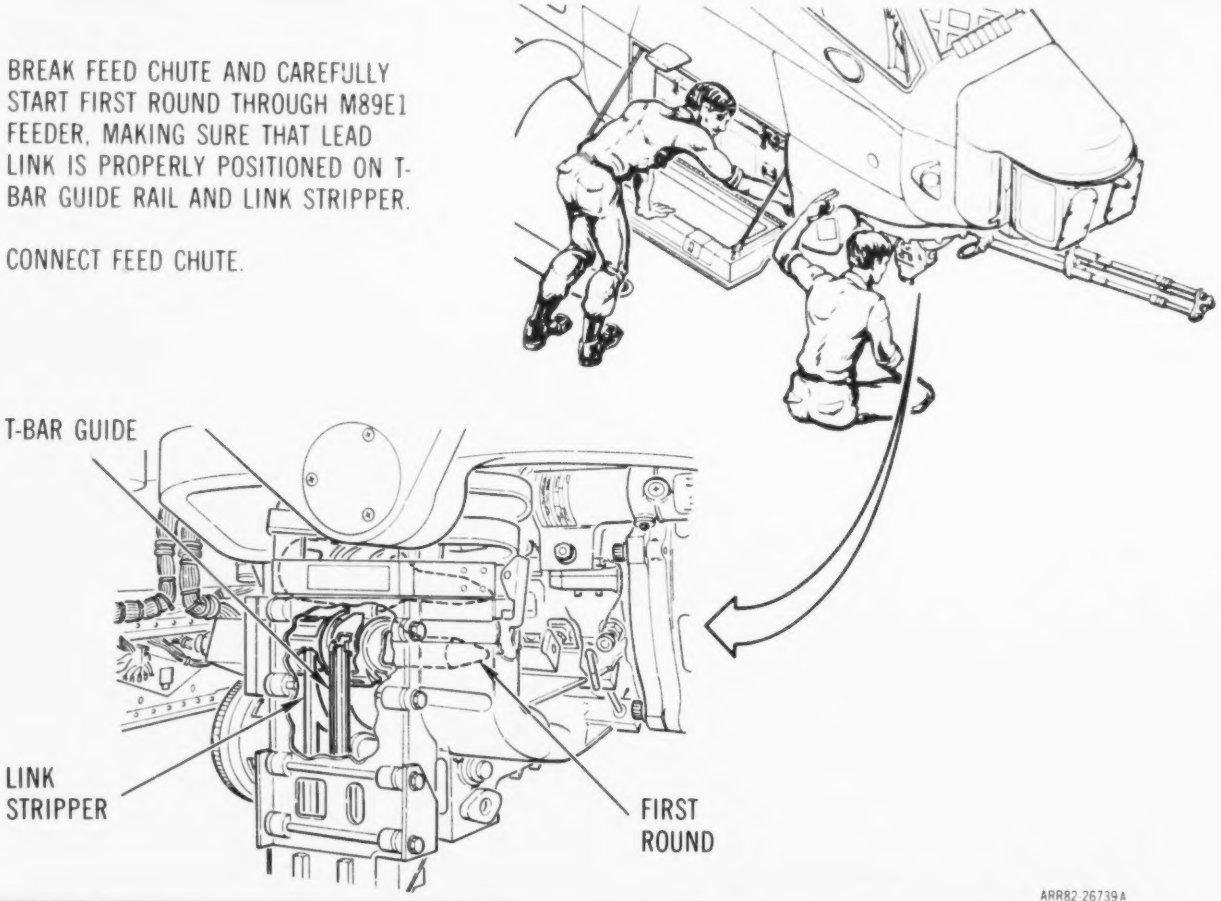
ARR82-26737

AMMUNITION HANDLING TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
4. USING AMMUNITION LOAD SWITCH IN AMMUNITION STORAGE AREA, RUN DUMMY AMMUNITION THROUGH FEED CHUTE TO M89E1 FEEDER.		
Ammunition travels down to M89E1 feeder.	a. Ammunition does not move.	a. Perform GUN FUNCTION TEST. (PARA 3-26).
	b. Ammunition hangs up in chute.	b. Disassemble and remove mislinked rounds.

5. BREAK FEED CHUTE AND CAREFULLY START FIRST ROUND THROUGH M89E1 FEEDER, MAKING SURE THAT LEAD LINK IS PROPERLY POSITIONED ON T-BAR GUIDE RAIL AND LINK STRIPPER.

6. CONNECT FEED CHUTE.



3-31. AMMUNITION HANDLING TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
7. DEPRESS FEEDER SOLENOID AND MANUALLY ROTATE BARREL CLUSTER UNTIL SIX ROUNDS HAVE BEEN DELINKED.		
Three rounds have been ejected.	Cannot manually rotate barrel cluster.	1. Check feeder timing, check T-bar guide, and check for bent sprockets. See REPAIR OF M89E1 FEEDER. (PARA 3-42). 2. Check gun bolts and tracks. See REPAIR OF M197 GUN (PARA 3-46).
8. CONNECT W2P1 TO W3J1.		
9. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, CLOSE TURRET DRIVE MOTOR AND GUN MOTOR CIRCUIT BREAKERS.		

AMMUNITION HANDLING TEST (cont)

Test Condition/ Normal Indication	Abnormal Indication	Corrective Action
10. ON PILOT ARMAMENT CONTROL PANEL, SET WPN CONTR SWITCH TO FIXED AND MASTER ARM SWITCH TO ARM.		
11. PRESS AND HOLD PILOT CYCLIC STICK ACTION AND TRIGGER SWITCHES UNTIL ALL DUMMY ROUNDS CYCLE OUT OF SYSTEM.		
Dummy rounds are delinked and cycle through system.	a. Rounds are not cycled.	a. Perform GUN FUNCTION TEST (PARA 3-26).
	b. Jam occurs.	b. Clear jam, inspect for feed system damage and stretched links, and repeat AMMUNITION HANDLING TEST.
12. ON PILOT ARMAMENT CONTROL PANEL, SET WPN CONTR SWITCH TO GUNNER AND MASTER ARM SWITCH TO OFF.		
13. REMOVE POWER. SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.		

END OF TEST

Section VI. LINE REPLACEABLE UNIT CHECKS

Section Contents	Para
General	3-32
Checkout of Emergency Stow Control Unit	3-33
Checkout of Logic Control Unit	3-34
Checkout of Gun Control Unit	3-35
Checkout of Turret Control Unit	3-36
Checkout of Gunner Armament Control Panel	3-37
Checkout of Pilot Armament Control Panel	3-38
Checkout of Interface Control Unit	3-39
Checkout of Acquisition Switch	3-40
Checkout of Logic Relay Assembly	3-40.1
Checkout of Turret Buffer Amplifier	3-40.2

GENERAL

3-32. This section provides on helicopter checkout of the line replaceable units (LRUs). These checkouts use the test set to run a programmed test on each LRU. All checkouts require that the HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP be performed. This makes sure that all switches and circuit breakers are in a known condition prior to starting each checkout. The cable connections required for each checkout are given under Equipment Conditions. In the first part of each checkout, steps are given to verify the proper cable or cables have been connected. In most cases, the test set will run a programmed test, the results of which will be a PASS or FAIL. A FAIL indication means the unit under test requires repair at the next higher level of maintenance. In some cases, additional tests are required to verify the operability of a particular LRU. In these cases, after the technician has received a PASS indication for the first part of the checkout, he will be required to continue the checkout. When the LRU has met all the conditions of the checkout it is then considered operable and may be returned to service. As with all the system tests and checks, the switch positions are critical. For example, a Gunner Armament Control Panel will show a FAIL indication if a switch is in a wrong position. Always remove power when connecting or disconnecting cables.

3-33. CHECKOUT OF EMERGENCY STOW CONTROL UNIT

DESCRIPTION

This test covers: On helicopter checkout of emergency stow control unit with test set.

INITIAL SETUP

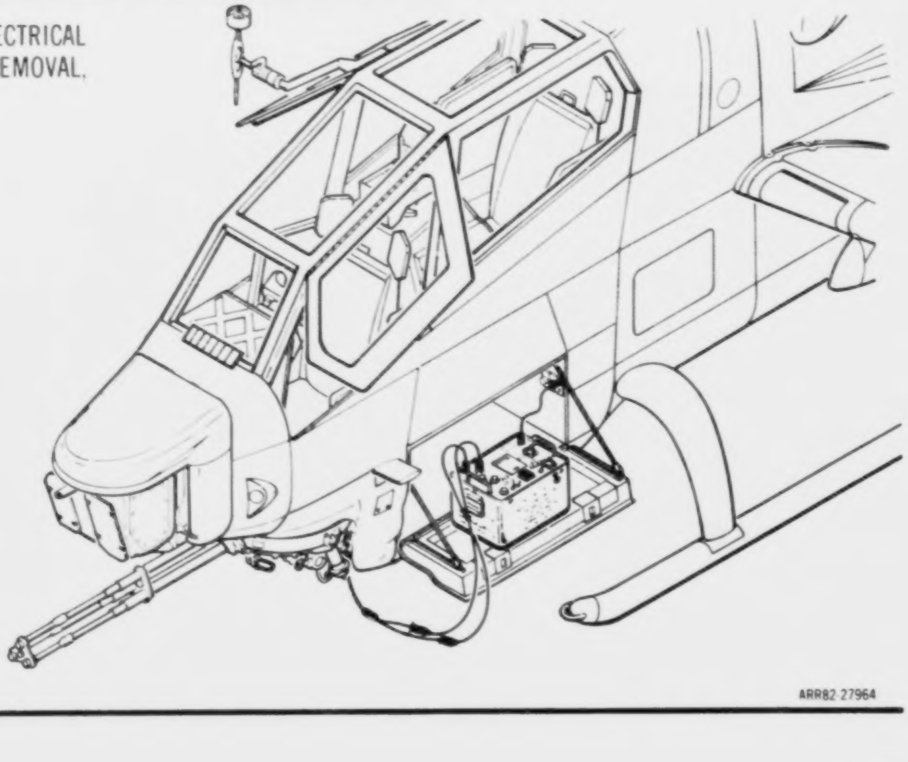
Tools/Test and Support Equipment:
- Tool Set, A/C Armament Repairman: Basic
- Tool Set, A/C Armament Repairman: Supplemental
- Electronics Systems Test Set: M137

Personnel Required:
- 68J Aircraft Fire Control Repairer

Equipment Conditions:
- HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP performed, para 2-6.
- Test set cables W1 and W10 connected, see TEST SET CABLE CONNECTIONS, para 3-17.

CHECKOUT OF EMERGENCY STOW CONTROL UNIT

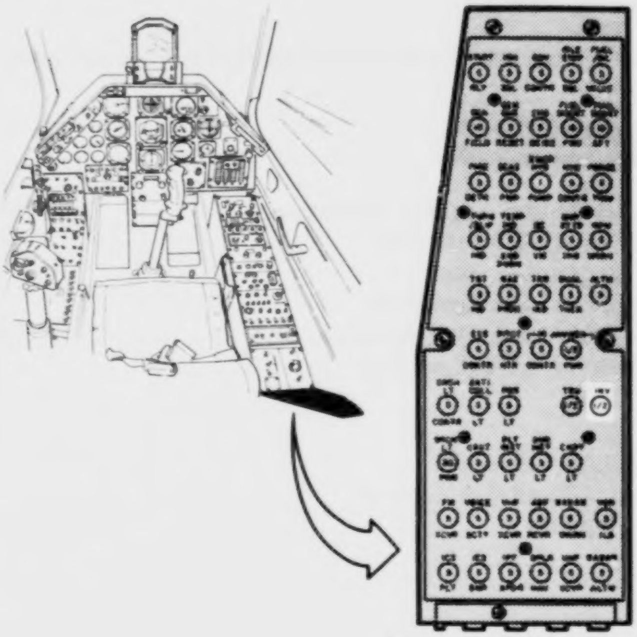
1. APPLY POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.



3-33. CHECKOUT OF EMERGENCY STOW CONTROL UNIT (cont)

CHECKOUT OF EMERGENCY STOW CONTROL UNIT (cont)

2. CLOSE INV CIRCUIT BREAKER ON DC CIRCUIT BREAKER PANEL.



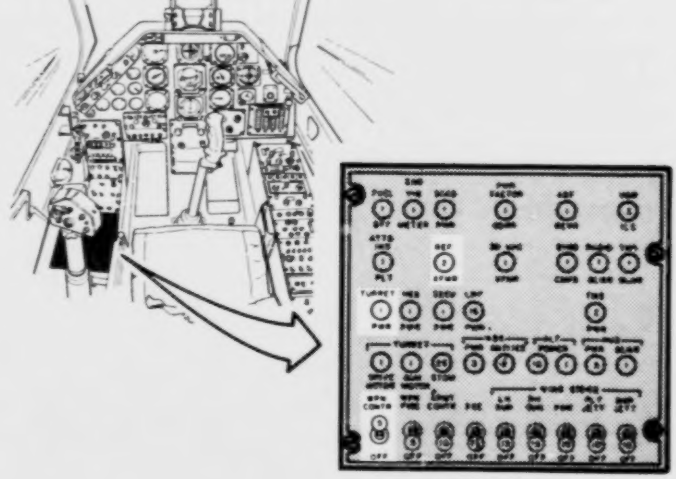
DC CIRCUIT BREAKER PANEL

ARR82-27965

---

3. CLOSE FOLLOWING CIRCUIT BREAKERS ON AC/ARMAMENT CIRCUIT BREAKER PANEL:

   REF XFMR
   WPN CONTR
   TURRET PWR

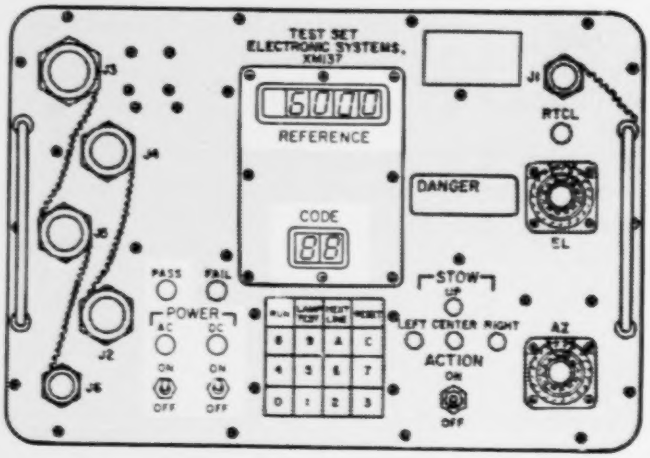


AC / ARMAMENT
CIRCUIT BREAKER PANEL

ARR82-27966

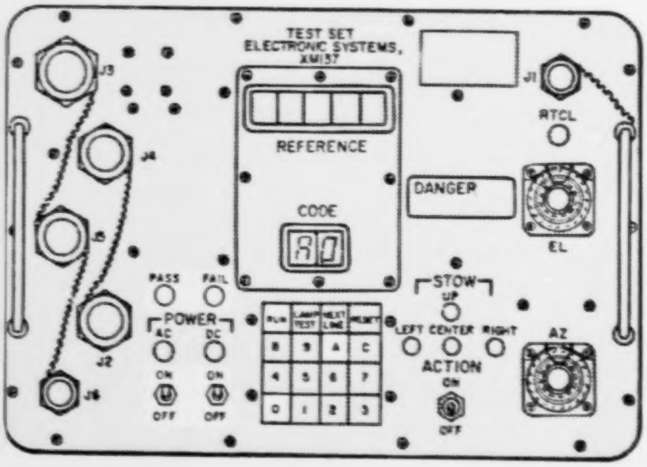
CHECKOUT OF EMERGENCY STOW CONTROL UNIT (cont)

4. ON TEST SET, SET AC AND DC CIRCUIT BREAKERS TO ON.
   a. AC and DC POWER indicators light.
   b. 8's appear in REFERENCE and CODE displays.
   c. PASS indicator lights.
5. ON TEST SET, PRESS RUN KEY.
   6000 appears in REFERENCE display.


TEST SET
ELECTRONIC SYSTEMS,
XM137
J3
J4
J5
J2
J6
J1
RTCL
6000
REFERENCE
CODE
88
DANGER
EL
PASS
FAIL
POWER
AC
DC
ON
OFF
STOW
UP
LEFT
CENTER
RIGHT
ACTION
ON
OFF
AZ
RUN
LAMP TEST
NEXT LINE
RESET
8
9
A
C
4
5
6
7
0
1
2
3

ARR82 27967

6. ON TEST SET, PRESS A, 0, AND RUN KEYS.
   a. Automatic test sequence runs.
   b. PASS or FAIL indicator lights.
   c. If FAIL indicator lights, emergency stow control unit requires repair at next higher level of maintenance. If PASS indicator lights unit is good.
7. ON TEST SET, SET AC AND DC CIRCUIT BREAKERS TO OFF.


TEST SET
ELECTRONIC SYSTEMS,
XM137
J3
J4
J5
J2
J6
J1
RTCL
REFERENCE
CODE
A0
DANGER
EL
PASS
FAIL
POWER
AC
DC
ON
OFF
STOW
UP
LEFT
CENTER
RIGHT
ACTION
ON
OFF
AZ
RUN
LAMP TEST
NEXT LINE
RESET
8
9
A
C
4
5
6
7
0
1
2
3

ARR82 27968 A

3-33. CHECKOUT OF EMERGENCY STOW CONTROL UNIT (cont)

CHECKOUT OF EMERGENCY STOW CONTROL UNIT (cont)

8. REMOVE POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.

9. DISCONNECT TEST SET CABLES.

10. RETURN EMERGENCY STOW CONTROL UNIT TO SERVICE, IF GOOD, OR SEND TO NEXT HIGHER LEVEL FOR REPAIR.

END OF TEST

3-34. CHECKOUT OF LOGIC CONTROL UNIT

DESCRIPTION

This test covers: On helicopter checkout of logic control unit with test set.

INITIAL SETUP

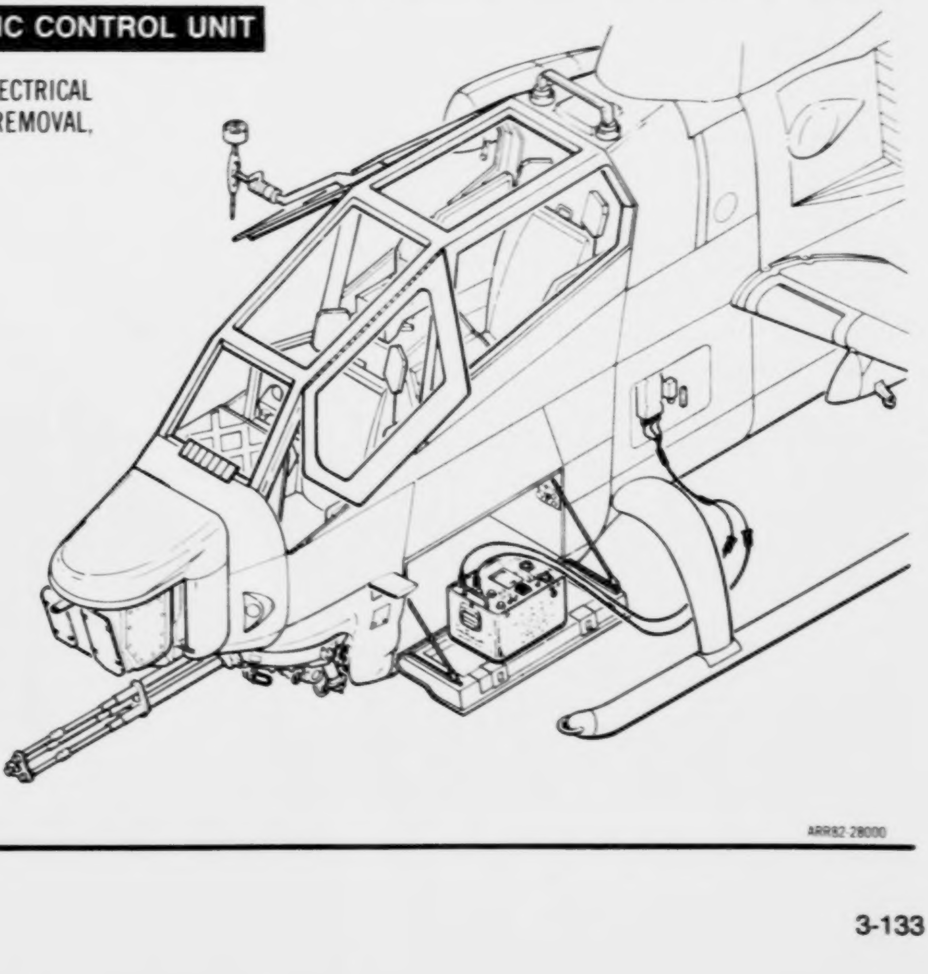
Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental
  Electronics Systems Test Set:
    M137

Personnel Required:
  68J Aircraft Fire Control
    Repairer

Equipment Conditions:
  HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP performed, para 2-6.
  Test set cables W1 and W14 connected, see TEST SET CABLE CONNECTIONS, para 3-17.

CHECKOUT OF LOGIC CONTROL UNIT

1. APPLY POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.

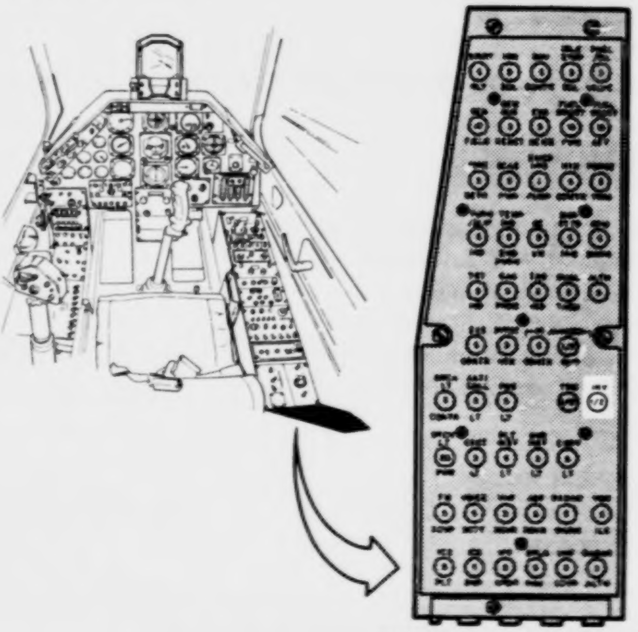


ARR82-28000

3-34. CHECKOUT OF LOGIC CONTROL UNIT (cont)

CHECKOUT OF LOGIC CONTROL UNIT (cont)

2. CLOSE INV CIRCUIT BREAKER ON DC CIRCUIT BREAKER PANEL.

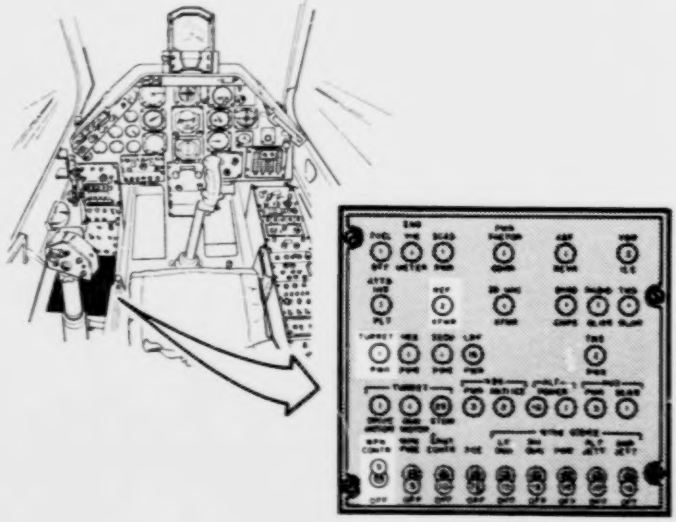


DC CIRCUIT BREAKER PANEL

ARRX2-28001

3. CLOSE FOLLOWING CIRCUIT BREAKERS ON AC/ARMAMENT CIRCUIT BREAKER PANEL:

   REF XFMR
   WPN CONTR
   TURRET PWR



AC / ARMAMENT
CIRCUIT BREAKER PANEL

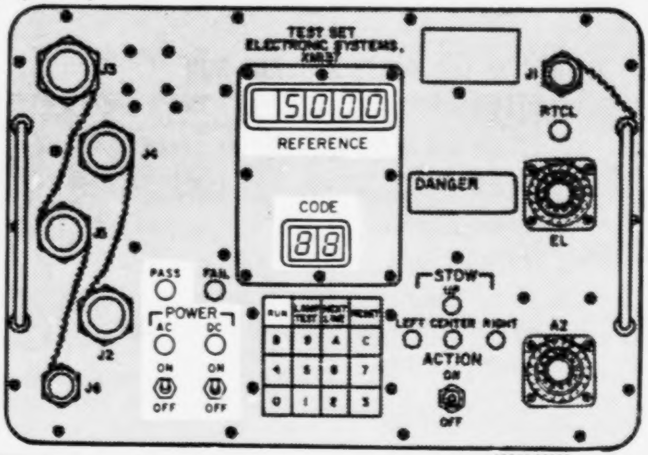
ARRX2-28002

CHECKOUT OF LOGIC CONTROL UNIT (cont)

4. ON TEST SET, SET AC AND DC CIRCUIT BREAKERS TO ON.
   a. AC and DC POWER indicators light.
   b. 8's appear in REFERENCE and CODE displays.
   c. PASS indicator lights.

5. ON TEST SET, PRESS RUN KEY.

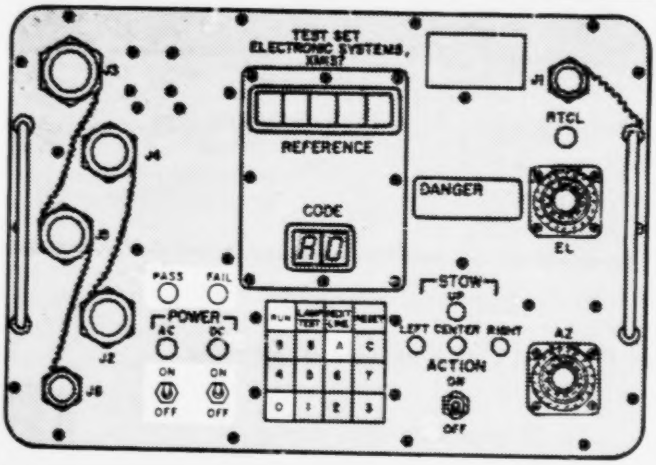
   5000 appears in REFERENCE display.


TEST SET
ELECTRONIC SYSTEMS,
J3
J4
J5
J2
J6
J1
RTCL
5000
REFERENCE
CODE
88
DANGER
EL
PASS
FAIL
POWER
AC
DC
ON
OFF
STOW
UP
LEFT CENTER RIGHT
ACTION
AZ
RUN
LAMP TEST
NEXT LINE
RESET
8 9 A C
4 5 6 7
0 1 2 3

ARR82 28003

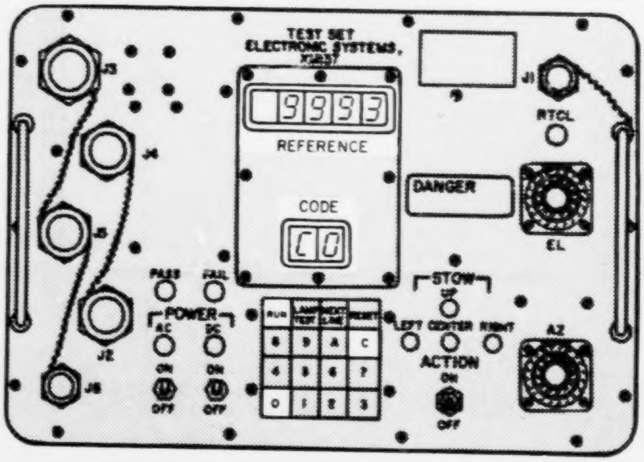
6. ON TEST SET, PRESS A, 0, AND RUN KEYS.
   a. Automatic test sequence runs.
   b. PASS or FAIL indicator lights.
   c. If FAIL indicator lights, logic control unit requires repair at next higher level of maintenance. If PASS indicator lights, unit checks good.

7. IF LOGIC CONTROL UNIT CHECKS GOOD, GO TO NEXT STEP. IF UNIT FAILS, GO TO STEP 13.


TEST SET
ELECTRONIC SYSTEMS,
J3
J4
J5
J2
J6
J1
RTCL
REFERENCE
CODE
A0
DANGER
EL
PASS
FAIL
POWER
AC
DC
ON
OFF
STOW
UP
LEFT CENTER RIGHT
ACTION
AZ

ARR82 28004 A

8. ON TEST SET, PRESS C, 0, AND RUN KEYS.
   a. C0 appears in CODE display.
   b. 9993 appears in REFERENCE display.

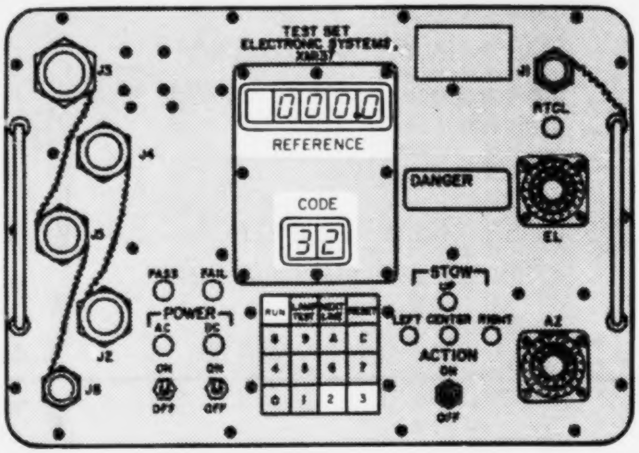

TEST SET
ELECTRONIC SYSTEMS,
J3
J4
J5
J2
J6
J1
RTCL
9993
REFERENCE
CODE
C0
DANGER
EL
PASS
FAIL
POWER
AC
DC
ON
OFF
STOW
UP
LEFT CENTER RIGHT
ACTION
AZ

ARR82 28005

3-34. CHECKOUT OF LOGIC CONTROL UNIT (cont)

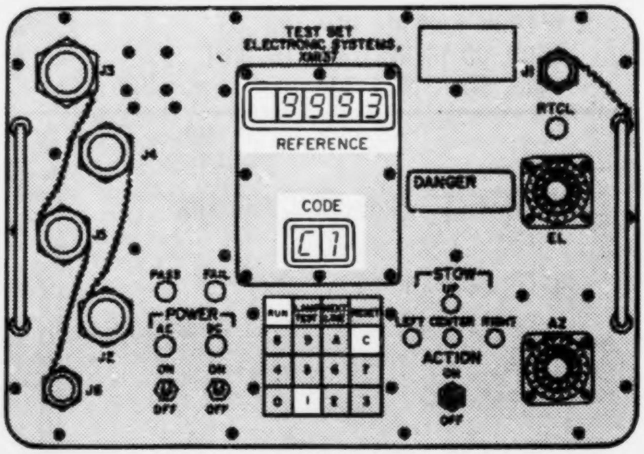
CHECKOUT OF LOGIC CONTROL UNIT (cont)

9. ON TEST SET, PRESS 3, 2, AND RUN KEYS.
   a. 32 appears in CODE display.
   b. REFERENCE display indicates approximately 0 (Vdc).
   c. If indication is abnormal, logic control unit requires repair at next higher level of maintenance. If indication is normal, unit checks good.
10. IF LOGIC CONTROL UNIT CHECKS GOOD, GO TO NEXT STEP. IF UNIT REQUIRES REPAIR, GO TO STEP 13.


TEST SET
ELECTRONIC SYSTEMS,
J3
J4
J5
J2
J6
J1
RTCL
0000
REFERENCE
DANGER
EL
CODE
32
PASS
FAIL
POWER
AC
DC
ON
OFF
RUN
LAMP TEST
NEXT LINE
RESET
8 9 A C
4 5 6 7
0 1 2 3
STOW
UP
LEFT
CENTER
RIGHT
ACTION
ON
OFF
AZ

ARR82-28006

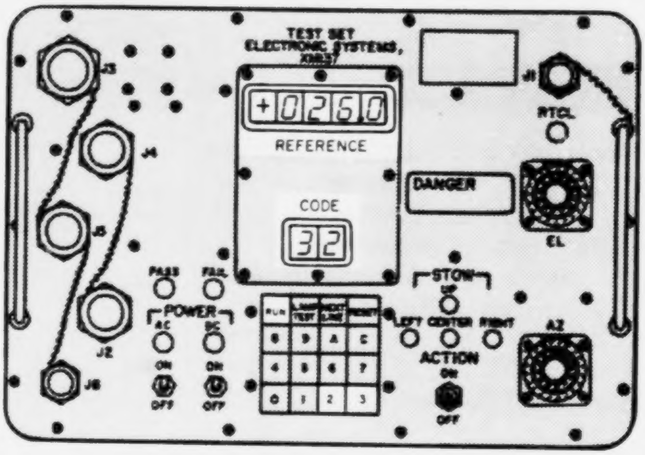
11. ON TEST SET, PRESS C, 1, AND RUN KEYS.
    a. C1 appears in CODE display.
    b. 9993 appears in REFERENCE display.


TEST SET
ELECTRONIC SYSTEMS,
J3
J4
J5
J2
J6
J1
RTCL
9993
REFERENCE
DANGER
EL
CODE
C1
PASS
FAIL
POWER
AC
DC
ON
OFF
RUN
LAMP TEST
NEXT LINE
RESET
8 9 A C
4 5 6 7
0 1 2 3
STOW
UP
LEFT
CENTER
RIGHT
ACTION
ON
OFF
AZ

ARR82-28007

CHECKOUT OF LOGIC CONTROL UNIT (cont)

12. ON TEST SET, PRESS 3, 2, AND RUN KEYS.
    a. 32 appears in CODE display.
    b. REFERENCE display indicates approximately 26 ± 4 (Vdc).
    c. If indication is abnormal, logic control unit requires repair at next higher level of maintenance. If indication is normal, unit checks good.


TEST SET
ELECTRONIC SYSTEMS,
XM837
J3
J4
J5
J2
J6
J1
RTCL
+0260
REFERENCE
CODE
32
DANGER
EL
AZ
PASS
FAIL
POWER
AC
DC
ON
OFF
RUN
LAMP TEST
NEXT LINE
RESET
8
9
A
C
4
5
6
7
0
1
2
3
STOW
UP
LEFT
CENTER
RIGHT
ACTION
ON
OFF

ARR82 2800B

13. ON TEST SET, SET AC AND DC CIRCUIT BREAKERS TO OFF.

14. REMOVE POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.

15. DISCONNECT TEST SET CABLES.

16. RETURN LOGIC CONTROL UNIT TO SERVICE, IF GOOD, OR SEND TO NEXT HIGHER LEVEL FOR REPAIR.

END OF TEST

3-35. CHECKOUT OF GUN CONTROL UNIT

DESCRIPTION

This test covers: On helicopter checkout of gun control unit with test set.

INITIAL SETUP

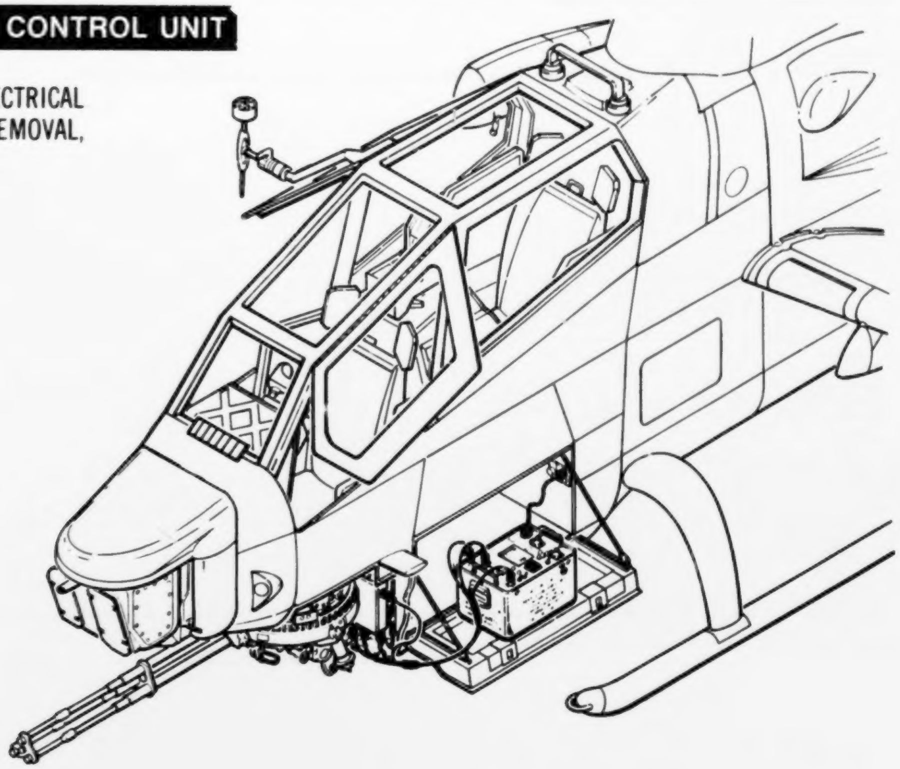
Tools/Test and Support Equipment:
- Tool Set, A/C Armament Repairman: Basic
- Tool Set, A/C Armament Repairman: Supplemental
- Electronics Systems Test Set: M137

Personnel Required:
- 68J Aircraft Fire Control Repairer

Equipment Conditions:
- HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP performed, para 2-6.
- Test set cables W1 and W9 connected, see TEST SET CABLE CONNECTIONS, para 3-17.

CHECKOUT OF GUN CONTROL UNIT

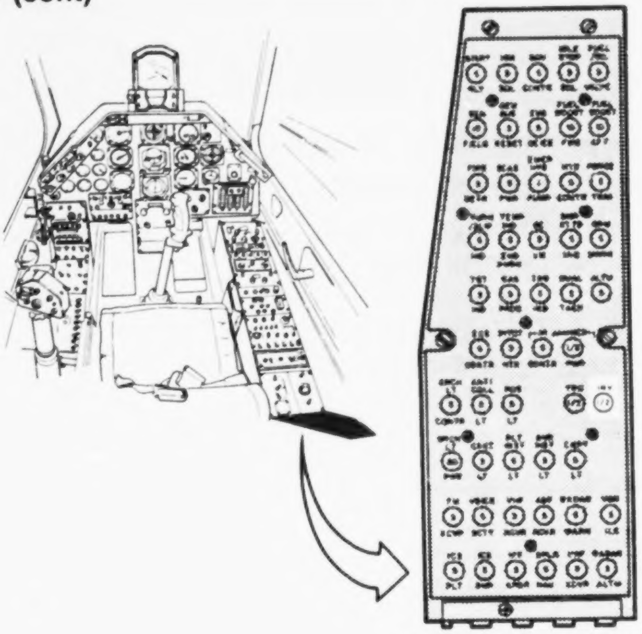
1. APPLY POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.



ARR82-28014

CHECKOUT OF GUN CONTROL UNIT (cont)

2. CLOSE INV CIRCUIT BREAKER ON DC CIRCUIT BREAKER PANEL.

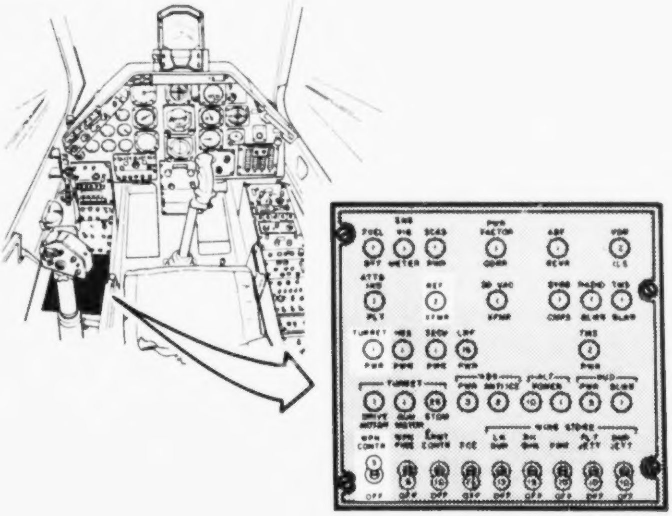


DC CIRCUIT BREAKER PANEL

ARR82-28015

3. CLOSE FOLLOWING CIRCUIT BREAKERS ON AC/ARMAMENT CIRCUIT BREAKER PANEL:

   REF XFMR
   WPN CONTR
   TURRET PWR



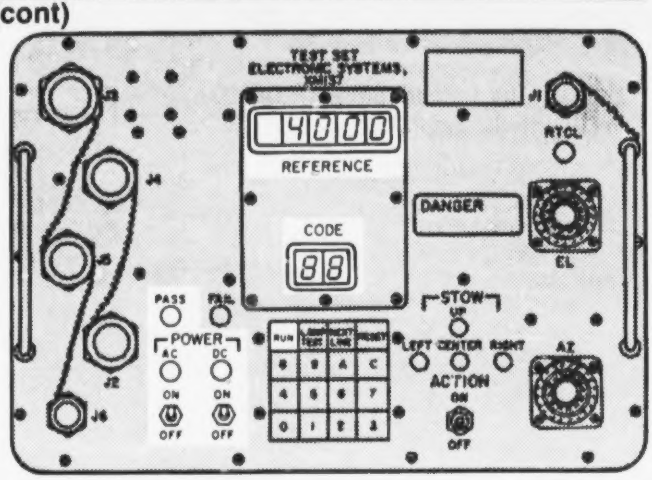
AC / ARMAMENT
CIRCUIT BREAKER PANEL

ARR82-28016

3-35. CHECKOUT OF GUN CONTROL UNIT (cont)

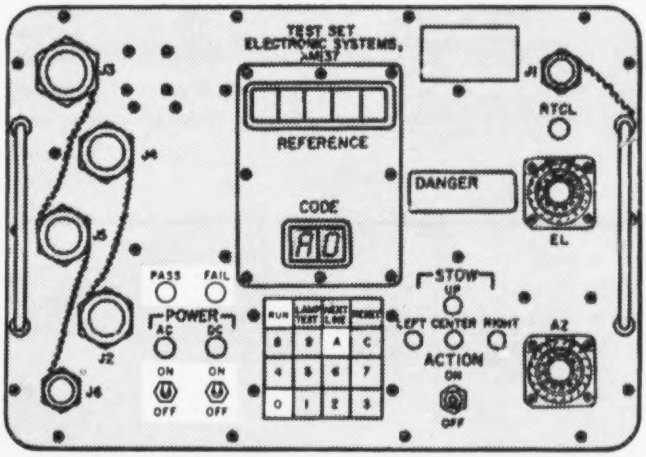
CHECKOUT OF GUN CONTROL UNIT (cont)

4. ON TEST SET, SET AC AND DC CIRCUIT BREAKERS TO ON.
   a. AC and DC POWER indicators light.
   b. 8's appear in REFERENCE and CODE displays.
   c. PASS indicator lights.
5. ON TEST SET, PRESS RUN KEY.
   4000 appears in REFERENCE display.


TEST SET
ELECTRONIC SYSTEMS,
XM137
4000
REFERENCE
CODE
88
DANGER
J1
J2
J3
J4
J5
J6
RTCL
EL
AZ
PASS
FAIL
POWER
AC
DC
ON
OFF
RUN
LAMP TEST
NEXT LINE
RESET
STOW
UP
LEFT
CENTER
RIGHT
ACTION
ON
OFF

ARR82 28017

6. ON TEST SET, PRESS A, 0, AND RUN KEYS.
   a. Automatic test sequence runs.
   b. PASS or FAIL indicator lights.
   c. If FAIL indicator lights, gun control unit requires repair at next higher level of maintenance. If PASS indicator lights, unit checks good.
7. ON TEST SET, SET AC AND DC CIRCUIT BREAKERS TO OFF.


TEST SET
ELECTRONIC SYSTEMS,
XM137
REFERENCE
CODE
A0
DANGER
J1
J2
J3
J4
J5
J6
RTCL
EL
AZ
PASS
FAIL
POWER
AC
DC
ON
OFF
RUN
LAMP TEST
NEXT LINE
RESET
STOW
UP
LEFT
CENTER
RIGHT
ACTION
ON
OFF

ARP82 28018 A

8. REMOVE POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.
9. DISCONNECT TEST SET CABLES.
10. RETURN GUN CONTROL UNIT TO SERVICE, IF GOOD, OR SEND TO NEXT HIGHER LEVEL FOR REPAIR.

END OF TEST

3-36. CHECKOUT OF TURRET CONTROL UNIT

DESCRIPTION

This test covers: On helicopter checkout of turret control unit with test set.

INITIAL SETUP

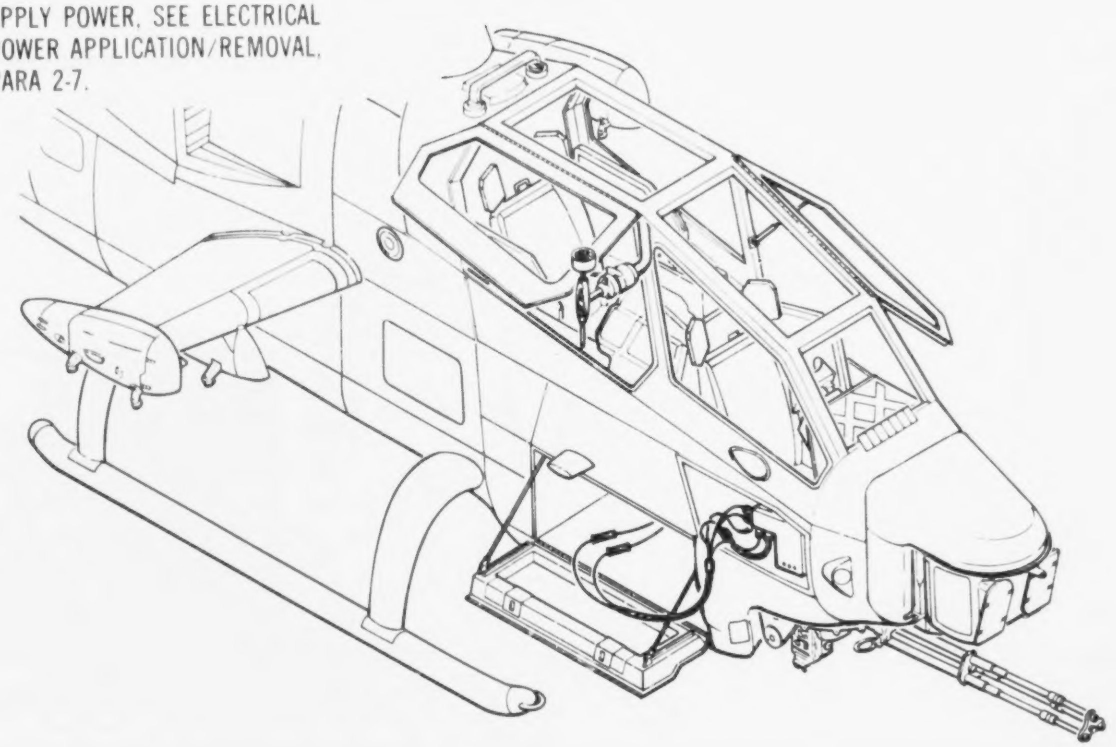
Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental
  Electronics Systems Test Set:
    M137

Personnel Required:
  68J Aircraft Fire Control
    Repairer

Equipment Conditions:
  HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP performed, para 2-6.
  Test set cables W1 and W8 connected, see TEST SET CABLE CONNECTIONS, para 3-17.

CHECKOUT OF TURRET CONTROL UNIT

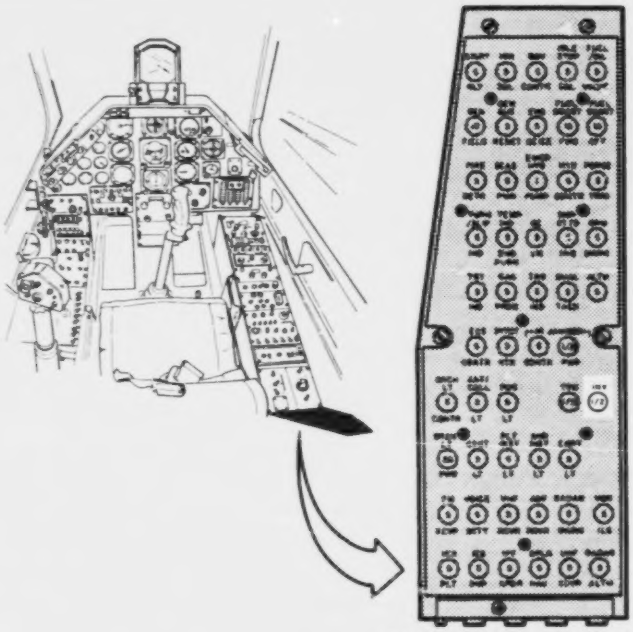
1. APPLY POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.



ARR82 27995

3-36. CHECKOUT OF TURRET CONTROL UNIT (cont)

2. CLOSE INV CIRCUIT BREAKER ON DC CIRCUIT BREAKER PANEL.

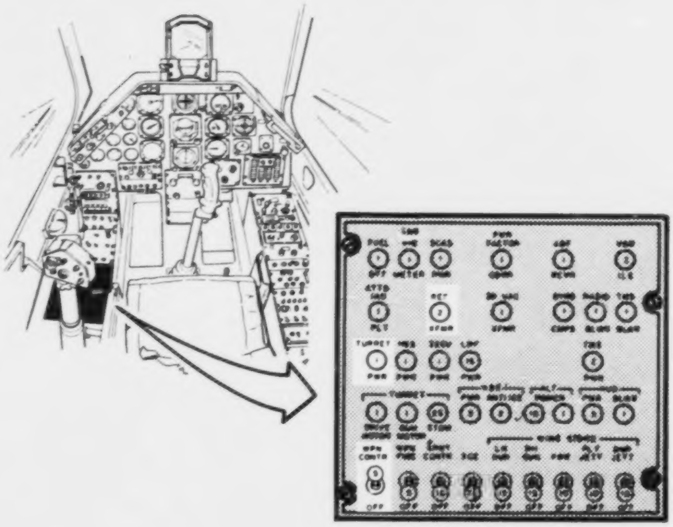


DC CIRCUIT BREAKER PANEL

ARR82 27996

3. CLOSE FOLLOWING CIRCUIT BREAKERS ON AC/ARMAMENT CIRCUIT BREAKER PANEL:

   REF XFMR
   WPN CONTR
   TURRET PWR



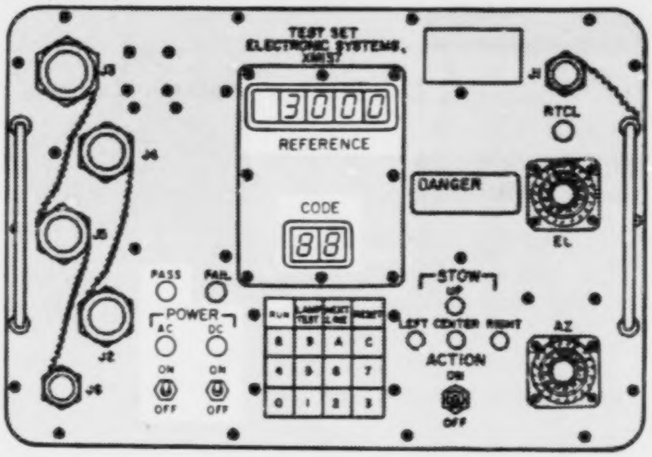
AC / ARMAMENT
CIRCUIT BREAKER PANEL

ARR82-27997

CHECKOUT OF TURRET CONTROL UNIT (cont)

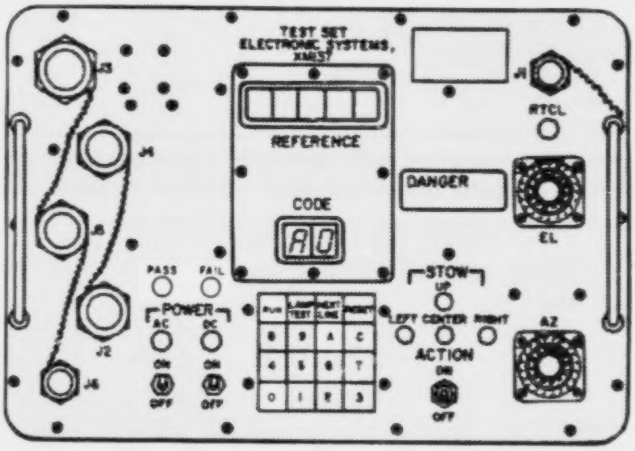
4. ON TEST SET, SET AC AND DC CIRCUIT BREAKERS TO ON.
   a. AC and DC POWER indicators light.
   b. 8's appear in REFERENCE and CODE displays.
   c. PASS indicator lights.
5. ON TEST SET, PRESS RUN KEY.

   3000 appears in REFERENCE display.


TEST SET
ELECTRONIC SYSTEMS, XM157
J3
J4
J5
J2
J6
J1
RTCL
3000
REFERENCE
CODE
88
DANGER
EL
AZ
PASS
FAIL
POWER
AC
DC
ON
OFF
RUN
LAMP TEST
NEXT CLOSE
RESET
8 9 A C
4 5 6 7
0 1 2 3
STOW
UP
LEFT CENTER RIGHT
ACTION
ON
OFF

ARR82 27998

6. ON TEST SET, PRESS A, 0, AND RUN KEYS.
   a. Automatic test sequence runs.
   b. PASS or FAIL indicator lights.
   c. If FAIL indicator lights, turret control unit requires repair at next higher level of maintenance. If PASS indicator lights, unit is good.
7. ON TEST SET, SET AC AND DC CIRCUIT BREAKERS TO OFF.


TEST SET
ELECTRONIC SYSTEMS, XM157
J3
J4
J5
J2
J6
J1
RTCL
REFERENCE
CODE
A0
DANGER
EL
AZ
PASS
FAIL
POWER
AC
DC
ON
OFF
RUN
LAMP TEST
NEXT CLOSE
RESET
8 9 A C
4 5 6 7
0 1 2 3
STOW
UP
LEFT CENTER RIGHT
ACTION
ON
OFF

ARR82 27999

8. REMOVE POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.
9. DISCONNECT TEST SET CABLES.
10. RETURN TURRET CONTROL UNIT TO SERVICE, IF GOOD, OR SEND TO NEXT HIGHER LEVEL FOR REPAIR.

END OF TEST

3-37. CHECKOUT OF GUNNER ARMAMENT CONTROL PANEL

DESCRIPTION

This test covers: On helicopter checkout of gunner armament control panel with test set.

INITIAL SETUP

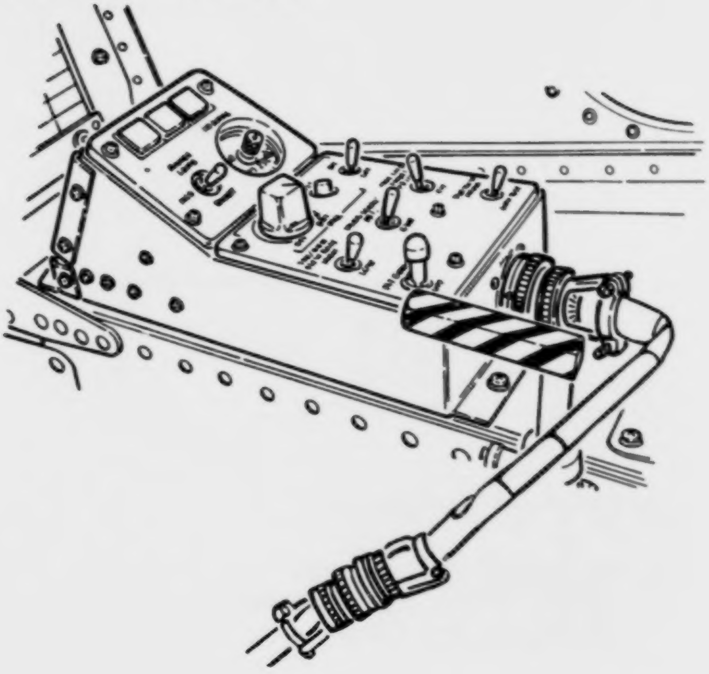
Tools/Test and Support Equipment:
- Tool Set, A/C Armament Repairman: Basic
- Tool Set, A/C Armament Repairman: Supplemental
- Electronics Systems Test Set: M137

Personnel Required:
- 68J Aircraft Fire Control Repairer (2)

Equipment Conditions:
- HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP performed, para 2-6.
- Test set cables W1 and W22 connected, see TEST SET CABLE CONNECTIONS, para 3-17.

CHECKOUT OF GUNNER ARMAMENT CONTROL PANEL

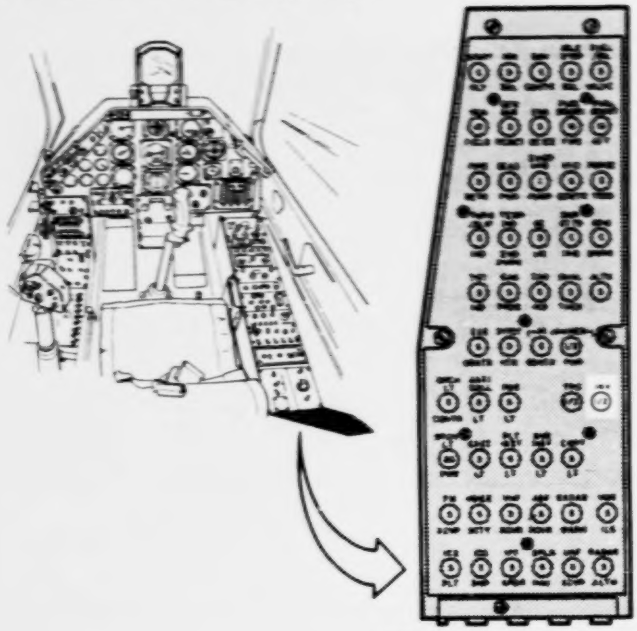
1. APPLY POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.



ARR82-27983

CHECKOUT OF GUNNER ARMAMENT CONTROL PANEL (cont)

2. CLOSE INV CIRCUIT BREAKER ON DC CIRCUIT BREAKER PANEL.

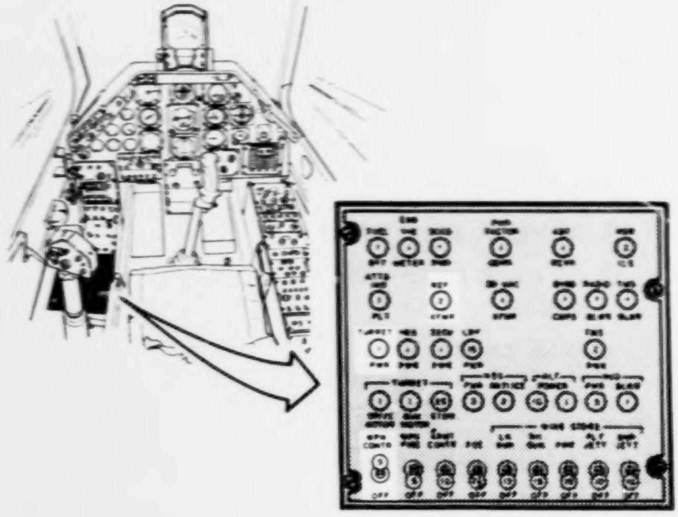


DC CIRCUIT BREAKER PANEL

ARR82 27984

3. CLOSE FOLLOWING CIRCUIT BREAKERS ON AC/ARMAMENT CIRCUIT BREAKER PANEL:

   REF XFMR
   WPN CONTR
   TURRET PWR

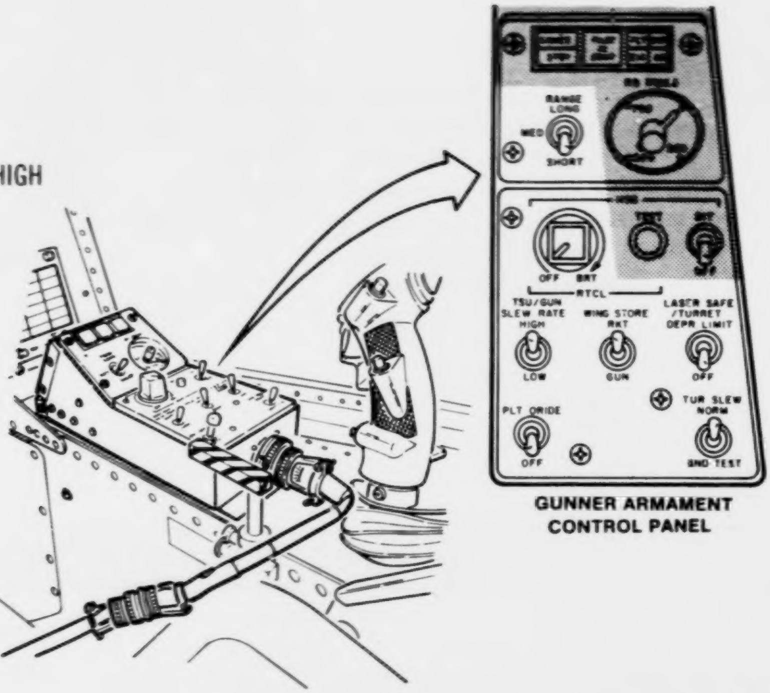


AC / ARMAMENT CIRCUIT BREAKER PANEL

ARR82 27985

3-37. CHECKOUT OF GUNNER ARMAMENT CONTROL PANEL (cont)

4. SET SWITCHES ON GUNNER ARMAMENT CONTROL PANEL AS FOLLOWS:
   - PLT ORIDE to OFF
   - RANGE to SHORT
   - WING STORE to RKT
   - HSS RTCL to OFF
   - TUR SLEW to NORM
   - LASER SAFE/TURRET
   - DEPR LIMIT to OFF
   - TSU/GUN SLEW RATE to HIGH

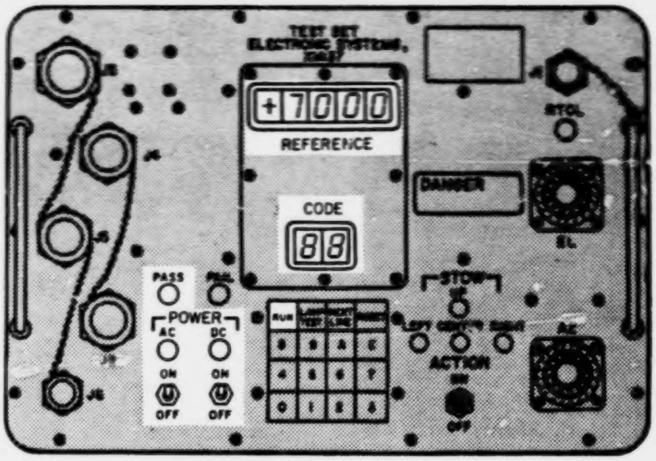

RANGE
LONG
MED
SHORT
OFF
BRT
RTCL
TSU/GUN
SLEW RATE
HIGH
LOW
WING STORE
RKT
GUN
LASER SAFE
/TURRET
DEPR LIMIT
OFF
TUR SLEW
NORM
GND TEST
PLT ORIDE
OFF

GUNNER ARMAMENT CONTROL PANEL

ARRB2-27986

5. ON TEST SET, SET AC AND DC CIRCUIT BREAKERS TO ON.
   a. AC and DC power indicators light.
   b. 8's appear in REFERENCE and CODE displays.
   c. PASS indicator lights.
6. ON TEST SET, PRESS RUN KEY.

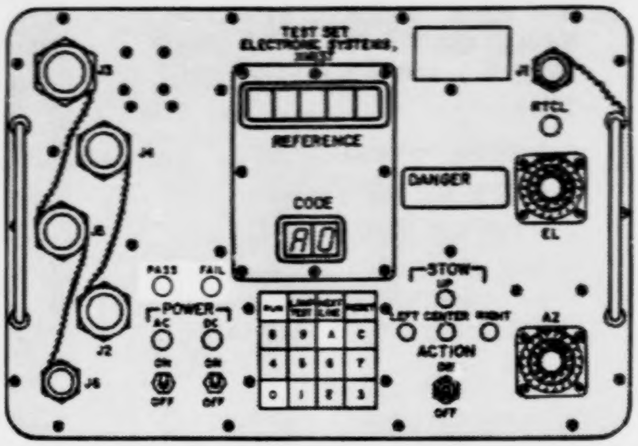
   +7000 appears in REFERENCE display.


TEST SET
ELECTRONIC SYSTEMS
+7000
REFERENCE
CODE
88
DANGER
RTCL
PASS
FAIL
POWER
AC
DC
ON
OFF
RUN
STOW
LEFT
CENTER
RIGHT
ACTION
AC

ARRB2-27987

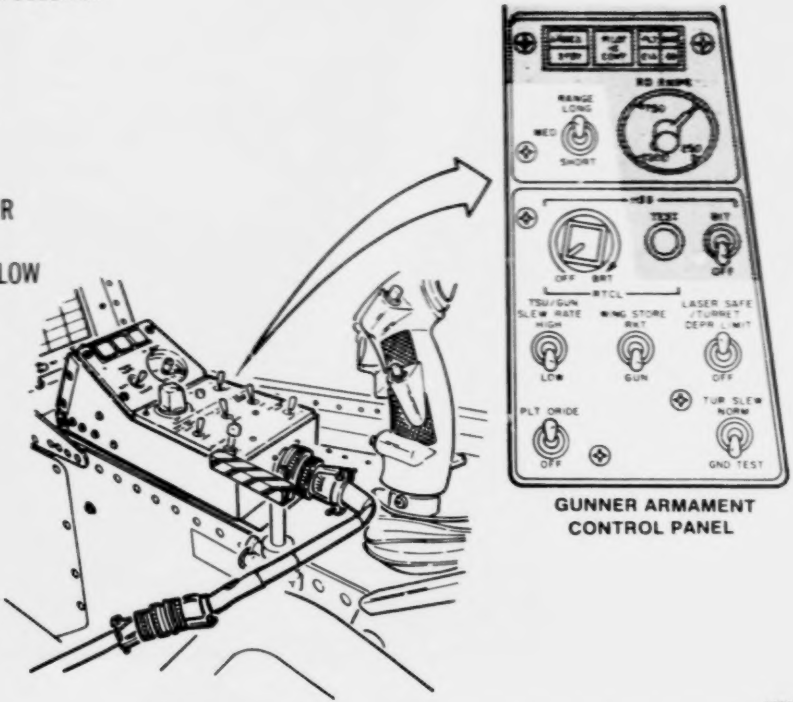
CHECKOUT OF GUNNER ARMAMENT CONTROL PANEL (cont)

7. ON TEST SET, PRESS A, 0, AND RUN KEYS.
   a. Automatic test sequence runs.
   b. PASS or FAIL indicator lights.
   c. If FAIL indicator lights, gunner armament control panel requires repair at next higher level of maintenance. If PASS indicator lights, panel checks good.
8. IF GUNNER ARMAMENT CONTROL PANEL CHECKS GOOD, GO TO NEXT STEP. IF PANEL FAILS, GO TO STEP 19.


TEST SET
ELECTRONIC SYSTEMS,
J3
J4
J5
J2
J6
J1
RTCL
REFERENCE
CODE
A0
DANGER
EL
PASS
FAIL
POWER
AC
DC
ON
OFF
ON
OFF
RUN
8
9
A
C
4
5
6
7
0
1
2
3
STOW
UP
LEFT
CENTER
RIGHT
ACTION
ON
OFF
AZ

ARR82 27988

9. SET SWITCHES ON GUNNER ARMAMENT CONTROL PANEL AS FOLLOWS:
   PLT ORIDE to ORIDE
   RANGE to MED
   WING STORE to GUN
   HSS RTCL to on (but not rotated to BRT)
   TUR SLEW to GND TEST
   LASER SAFE/TURRET DEPR LIMIT to on
   TSU/GUN SLEW RATE to LOW


RANGE
LONG
MED
SHORT
HSS
TEST
BIT
OFF
OFF
BRT
RTCL
TSU/GUN
SLEW RATE
HIGH
LOW
WING STORE
RKT
GUN
LASER SAFE
/TURRET
DEPR LIMIT
OFF
TUR SLEW
NORM
GND TEST
PLT ORIDE
OFF

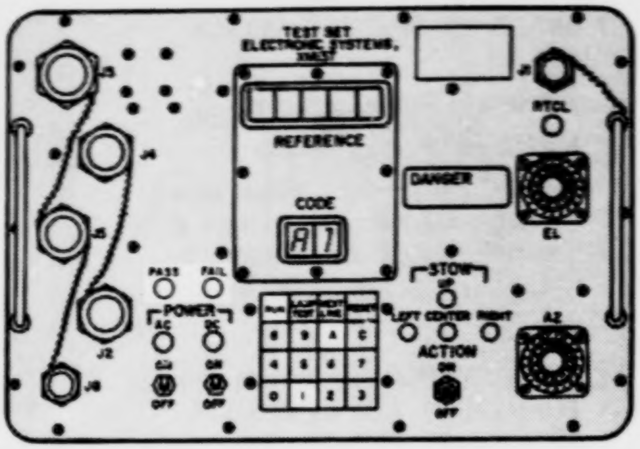
GUNNER ARMAMENT CONTROL PANEL

ARR82-27989

3-37. CHECKOUT OF GUNNER ARMAMENT CONTROL PANEL (cont)

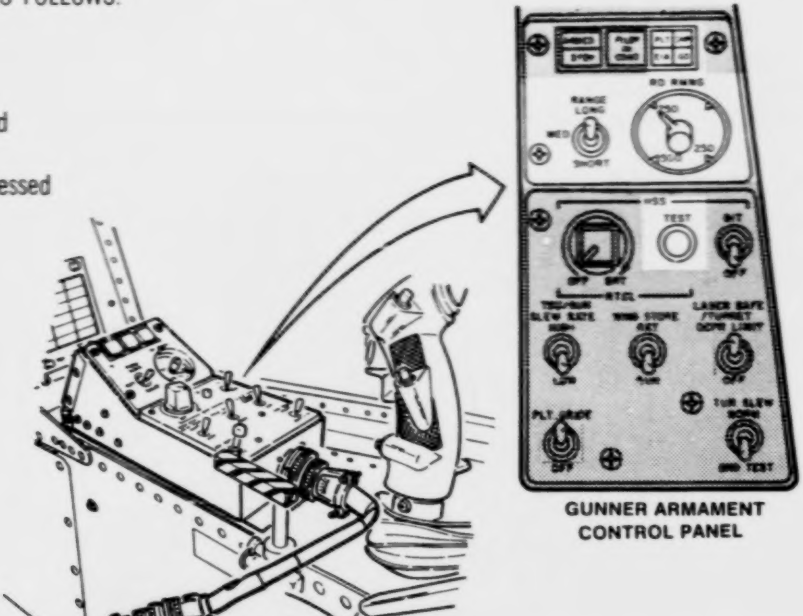
10. WITH HSS BIT SWITCH ON GUNNER ARMAMENT CONTROL PANEL HELD ON, PRESS A, 1, AND RUN KEYS ON TEST SET.
    a. Automatic test sequence runs.
    b. PASS or FAIL indicator lights.
    c. If FAIL indicator lights, gunner armament control panel requires repair at next higher level of maintenance. If PASS indicator lights, panel checks good.

11. IF GUNNER ARMAMENT CONTROL PANEL CHECKS GOOD, GO TO NEXT STEP. IF PANEL FAILS, GO TO STEP 19.


TEST SET ELECTRONIC SYSTEMS,
REFERENCE
CODE
A1
DANGER
RTCL
EL
AZ
STOW
UP
LEFT CENTER RIGHT
ACTION
ON
OFF
PASS
FAIL
POWER
AC
DC
ON
OFF
J1
J2
J3
J4
J5
J6
8 9 A C
4 5 6 7
0 1 2 3

ARR82-27990

12. SET SWITCHES ON GUNNER ARMAMENT CONTROL PANEL AS FOLLOWS:
    RANGE to LONG
    RD RMNG to 750
    HSS bit indicator (PLT/GNR/EIA/GO) held pressed during test
    HSS RTCL TEST held pressed during test.

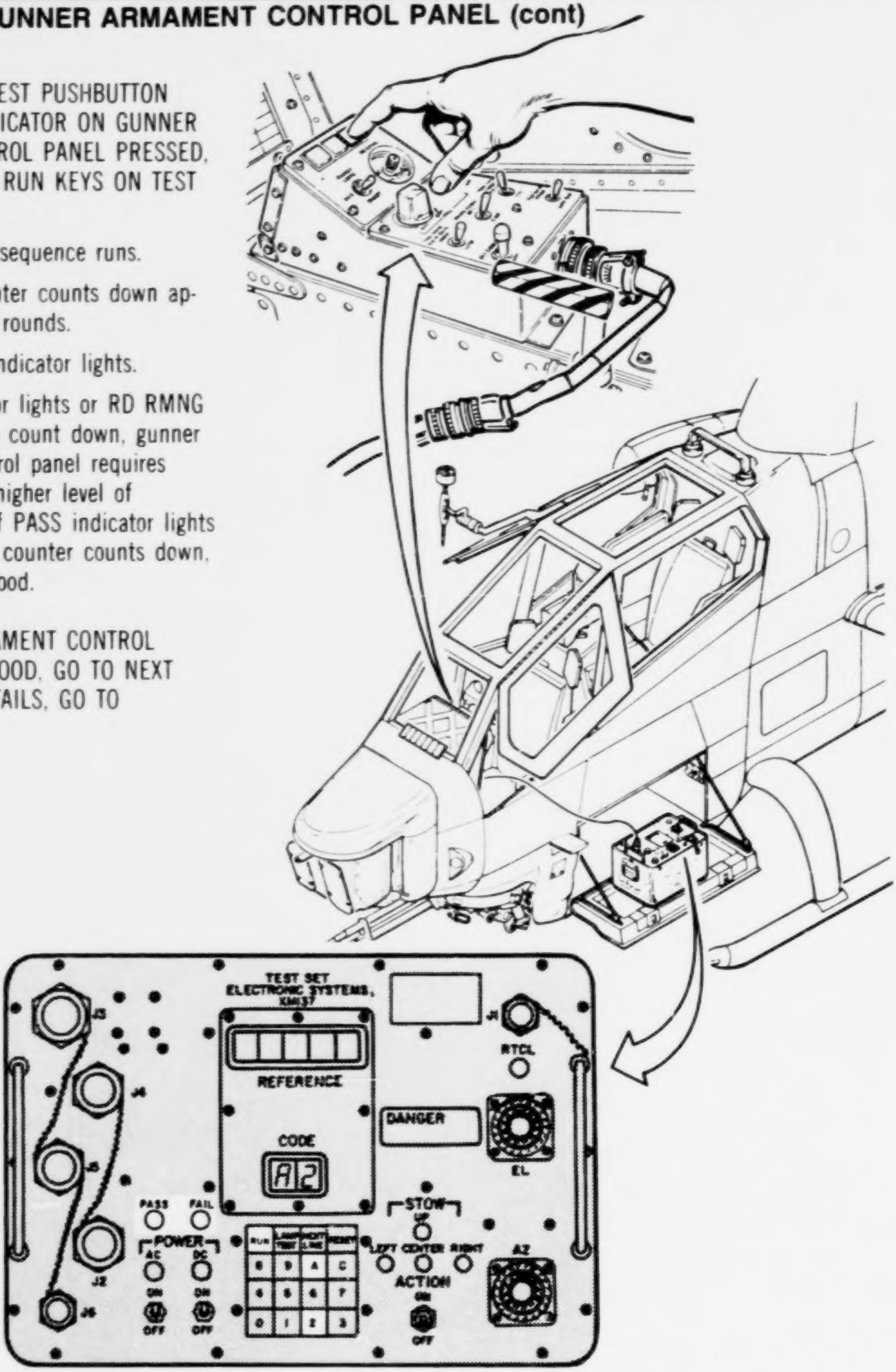

RANGE
LONG
MED
SHORT
RD RMNG
750
500
250
HSS
TEST
BIT
OFF
RTCL
GUNNER ARMAMENT CONTROL PANEL

ARR82-27991

CHECKOUT OF GUNNER ARMAMENT CONTROL PANEL (cont)

13. WITH HSS RTCL TEST PUSHBUTTON AND HSS BIT INDICATOR ON GUNNER ARMAMENT CONTROL PANEL PRESSED, PRESS A, 2, AND RUN KEYS ON TEST SET.
    a. Automatic test sequence runs.
    b. RD RMNG counter counts down approximately 50 rounds.
    c. PASS or FAIL indicator lights.
    d. If FAIL indicator lights or RD RMNG counter fails to count down, gunner armament control panel requires repair at next higher level of maintenance. If PASS indicator lights and RD RMNG counter counts down, panel checks good.

14. IF GUNNER ARMAMENT CONTROL PANEL CHECKS GOOD, GO TO NEXT STEP. IF PANEL FAILS, GO TO STEP 19.


TEST SET
ELECTRONIC SYSTEMS,
XM137
REFERENCE
CODE
A2
J1
J2
J3
J4
J5
J6
RTCL
DANGER
EL
AZ
STOW
UP
LEFT
CENTER
RIGHT
ACTION
ON
OFF
PASS
FAIL
POWER
AC
DC
ON
OFF
ON
OFF
RUN
LAMP TEST
NEXT LINE
RESET
8
9
A
C
4
5
6
7
0
1
2
3

ARR82-27992

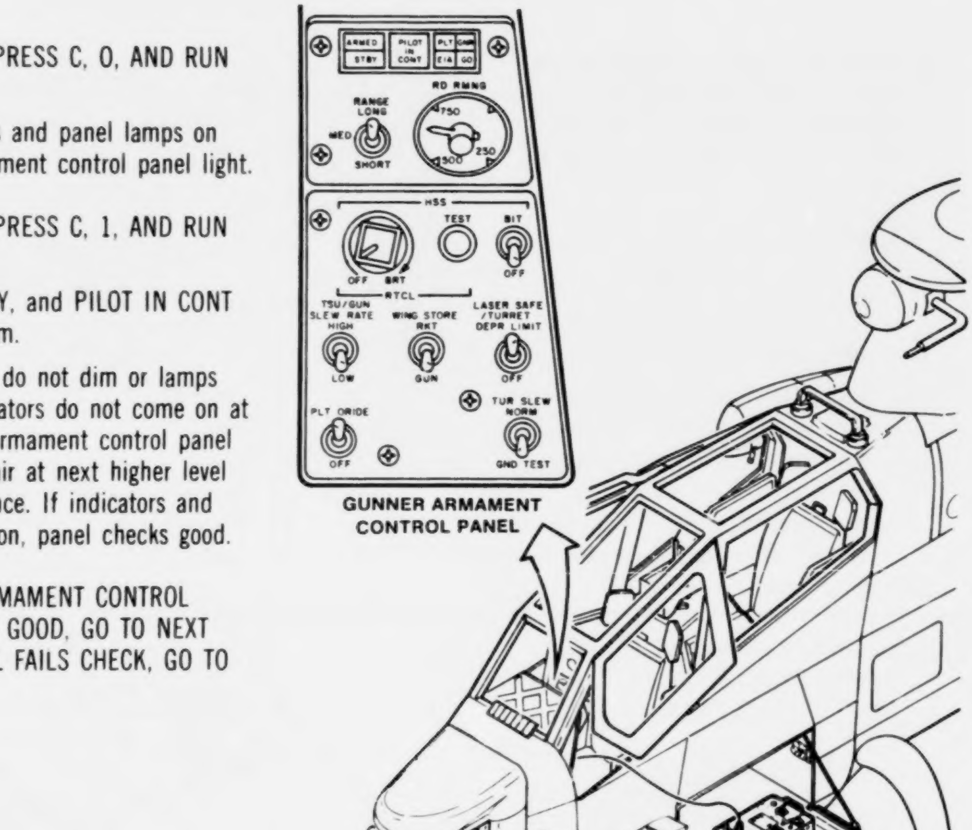
3-37. CHECKOUT OF GUNNER ARMAMENT CONTROL PANEL (cont)

15. ON TEST SET, PRESS C, 0, AND RUN KEYS.

    All indicators and panel lamps on gunner armament control panel light.

16. ON TEST SET, PRESS C, 1, AND RUN KEYS.
    a. ARMED, STBY, and PILOT IN CONT indicators dim.
    b. If indicators do not dim or lamps and/or indicators do not come on at all, gunner armament control panel requires repair at next higher level of maintenance. If indicators and lamps function, panel checks good.

17. IF GUNNER ARMAMENT CONTROL PANEL CHECKS GOOD, GO TO NEXT STEP. IF PANEL FAILS CHECK, GO TO STEP 19.

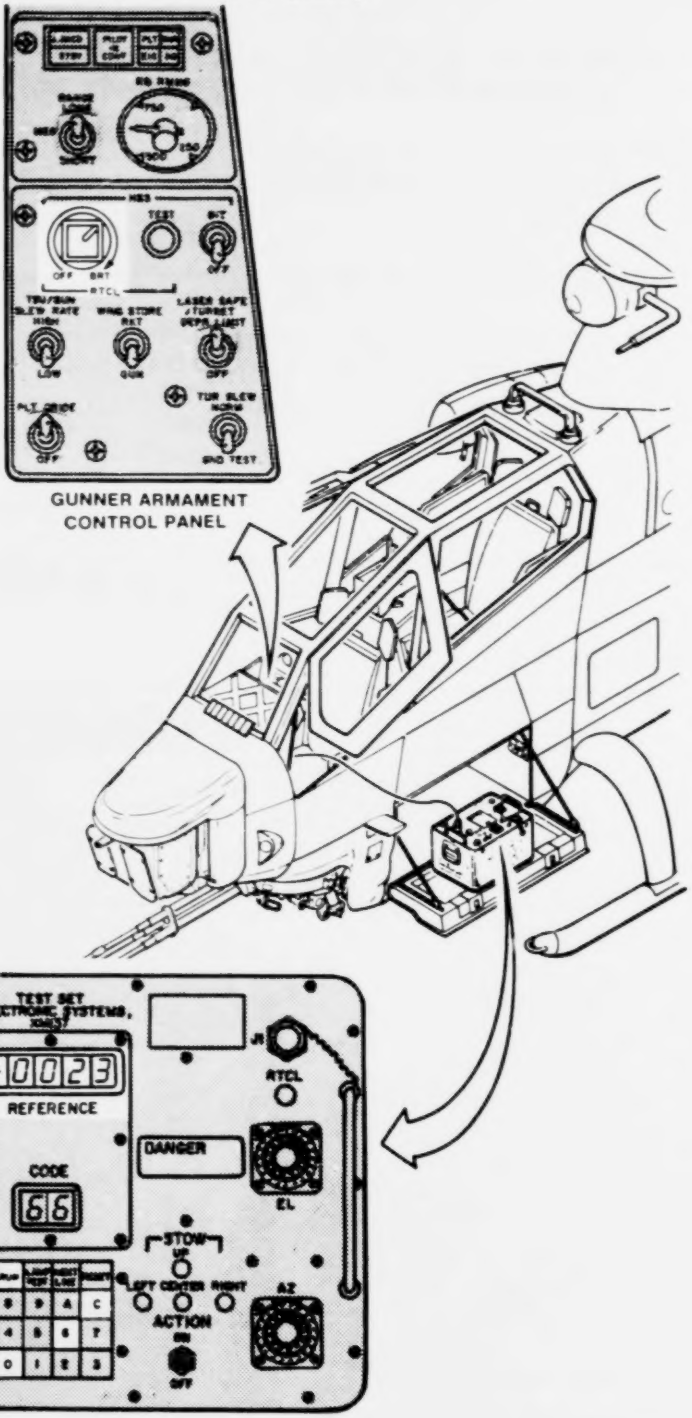

GUNNER ARMAMENT CONTROL PANEL

ARMED
STBY
PILOT IN CONT
PLT
GNR
E/A
GO
RD RMNG
RANGE LONG
MED
SHORT
750
250
500
HSS
TEST
BIT
OFF
BRT
RTCL
TSU/GUN SLEW RATE HIGH
LOW
WING STORE RKT
GUN
LASER SAFE /TURRET DEPR LIMIT
OFF
TUR SLEW NORM
GND TEST
PLT ORIDE
OFF
TEST SET ELECTRONIC SYSTEMS, XM137
J1
RTCL
REFERENCE
DANGER
EL
CODE
J3
J4
J5
J2
J6
PASS
FAIL
POWER
AC
DC
ON
OFF
RUN
LAMP TEST
NEXT BLOCK
RESET
8 9 A C
4 5 6 7
0 1 2 3
STOW
UP
LEFT
CENTER
RIGHT
ACTION
ON
OFF
AZ

ARR82-27993

CHECKOUT OF GUNNER ARMAMENT CONTROL PANEL (cont)

18. ON TEST SET, PRESS C, 0, AND RUN KEYS, THEN, PRESS 6, 6, AND RUN KEYS. ON GUNNER ARMAMENT CONTROL PANEL, ROTATE HSS RTCL INTENSITY KNOB BETWEEN OFF AND BRT WHILE OBSERVING REFERENCE DISPLAY ON TEST SET.
    a. Voltage readings in REFERENCE display vary with movement of knob.
    b. If reading is abnormal, gunner armament control panel requires repair at next higher level of maintenance. If readings vary, panel checks good.


HSS
TEST
BIT
OFF
OFF
BRT
RTCL
TSU/SUN SLEW RATE
HIGH
LOW
WING STORE
RKT
GUN
LASER SAFE /TURRET DEPR LIMIT
OFF
TUR SLEW
NORM
BND TEST
PLT ORIDE
OFF
GUNNER ARMAMENT CONTROL PANEL
TEST SET ELECTRONIC SYSTEMS, XM837
J3
J4
J5
J2
J6
J1
+0023
REFERENCE
CODE
66
DANGER
RTCL
EL
AZ
PASS
FAIL
POWER
AC
DC
ON
OFF
RUN
C
4
6
7
0
1
2
3
STOW
UP
LEFT
CENTER
RIGHT
ACTION
ON
OFF

ARR82-27994 A

3-37. CHECKOUT OF GUNNER ARMAMENT CONTROL PANEL (cont)

19. ON TEST SET, SET AC AND DC CIRCUIT BREAKERS TO OFF.

20. REMOVE POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.

21. DISCONNECT TEST SET CABLES.

22. RETURN GUNNER ARMAMENT CONTROL PANEL TO SERVICE, IF GOOD, OR SEND TO NEXT HIGHER LEVEL FOR REPAIR.

END OF TEST

3-38. CHECKOUT OF PILOT ARMAMENT CONTROL PANEL

DESCRIPTION

This test covers: On helicopter checkout of pilot armament control panel with test set.

INITIAL SETUP

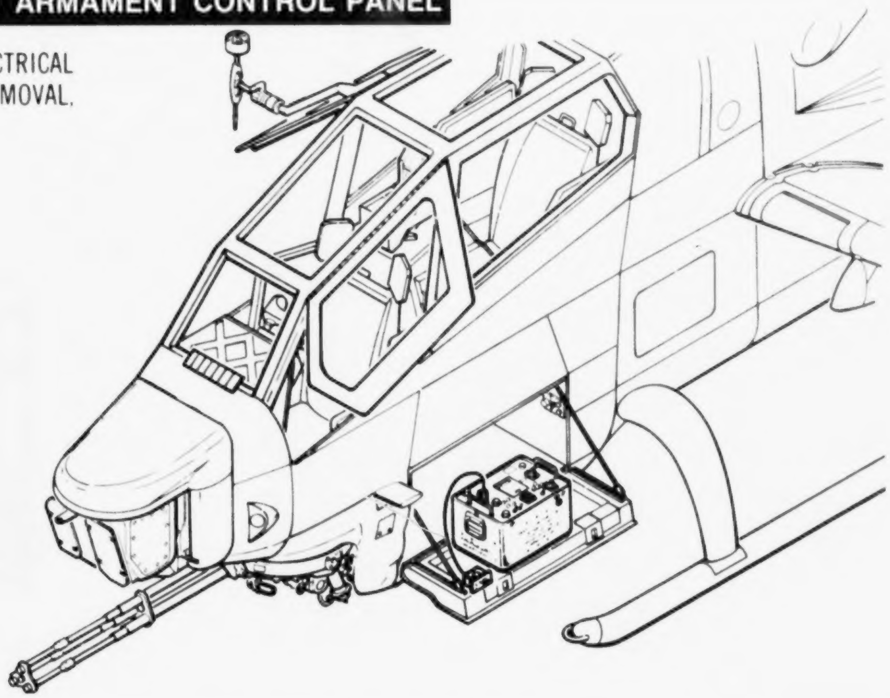
Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental
  Electronics Systems Test Set:
    M137

Personnel Required:
  68J Aircraft Fire Control
    Repairer

Equipment Conditions:
  HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP performed, para 2-6.
  Test set cables W1 and W23 connected, see TEST SET CABLE CONNECTIONS, para 3-17.

CHECKOUT OF PILOT ARMAMENT CONTROL PANEL

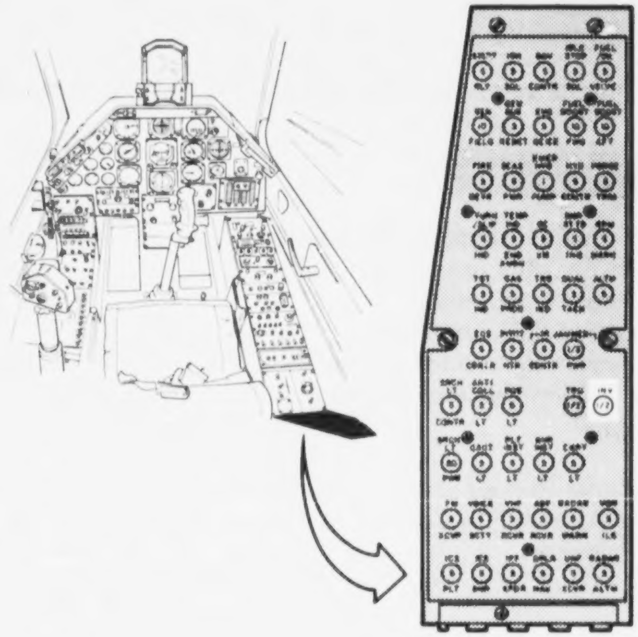
1. APPLY POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.



ARR82-27969

3-38. CHECKOUT OF PILOT ARMAMENT CONTROL PANEL (cont)

2. CLOSE INV CIRCUIT BREAKER ON DC CIRCUIT BREAKER PANEL.

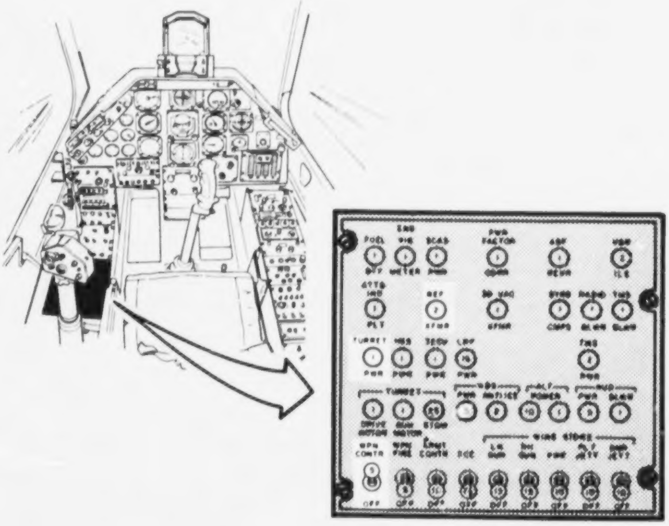


DC CIRCUIT BREAKER PANEL

ARR82-27970

3. CLOSE FOLLOWING CIRCUIT BREAKERS ON AC/ARMAMENT CIRCUIT BREAKER PANEL:

   REF XFMR
   WPN CONTR
   TURRET PWR

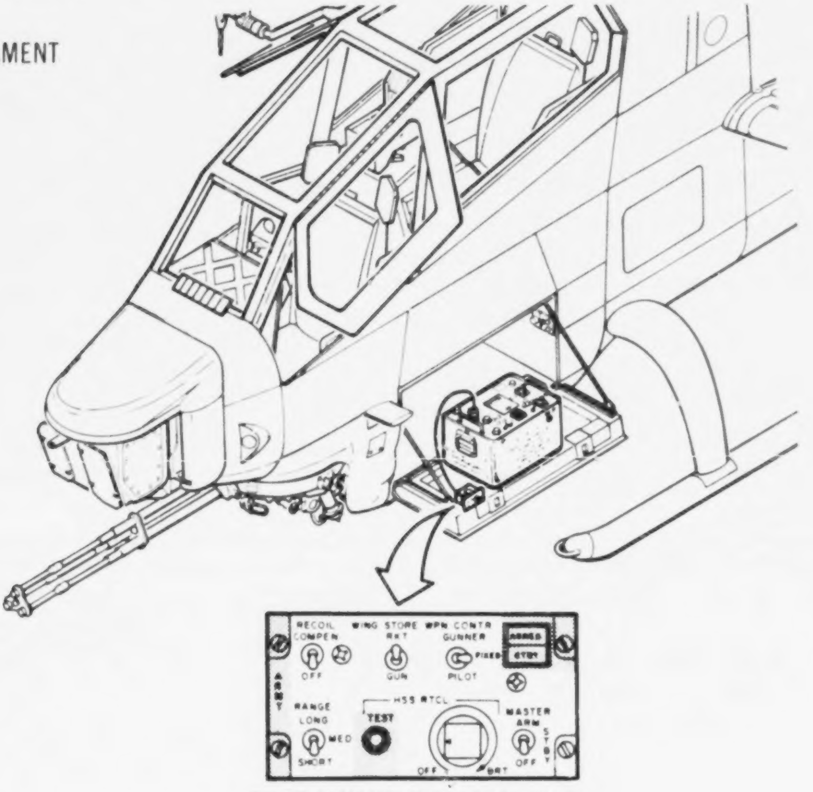


AC / ARMAMENT
CIRCUIT BREAKER PANEL

ARR82-27971

CHECKOUT OF PILOT ARMAMENT CONTROL PANEL (cont)

4. SET SWITCHES ON PILOT ARMAMENT CONTROL PANEL AS FOLLOWS:
   - WPN CONTR to FIXED
   - MASTER ARM to OFF
   - RECOIL COMPEN to OFF
   - RANGE to SHORT
   - WING STORE to RKT
   - HSS RTCL to OFF

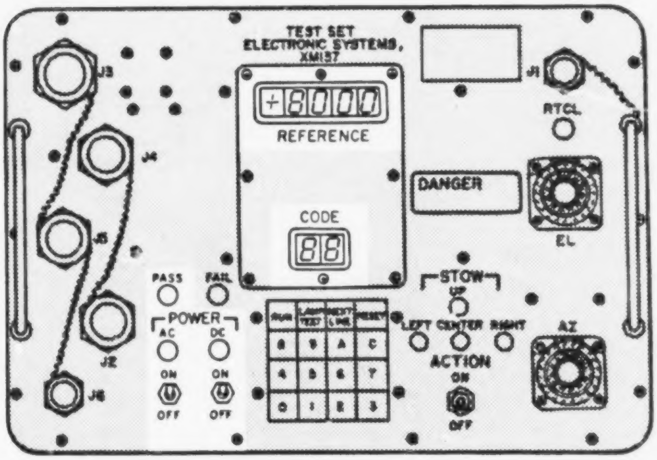

RECOIL COMPEN
OFF
WING STORE
RKT
GUN
WPN CONTR
GUNNER
FIXED
PILOT
ARMED
STBY
ARMT
RANGE
LONG
MED
SHORT
HSS RTCL
TEST
OFF
BRT
MASTER ARM
STBY
OFF

PILOT ARMAMENT CONTROL PANEL

ARR82-27972

5. ON TEST SET, SET AC AND DC CIRCUIT BREAKERS TO ON.
   a. AC and DC power indicators light.
   b. 8's appear in REFERENCE and CODE displays.
   c. PASS indicator lights.
6. ON TEST SET, PRESS RUN KEY.

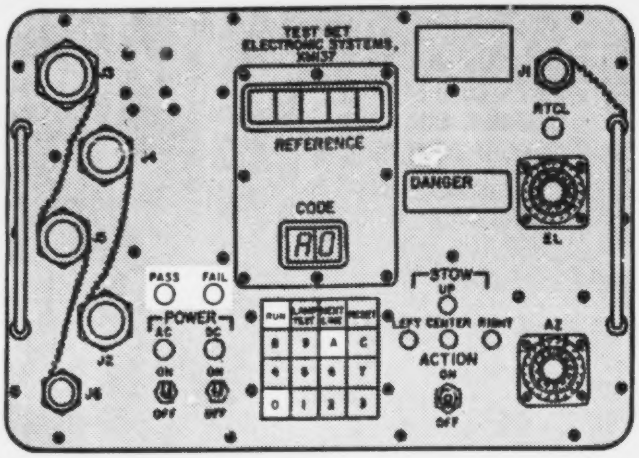
   +8000 appears in REFERENCE display.


TEST SET
ELECTRONIC SYSTEMS,
XM137
+8000
REFERENCE
CODE
88
J3
J4
J5
J2
J6
J1
RTCL
DANGER
EL
AZ
PASS
FAIL
POWER
AC
DC
ON
OFF
ON
OFF
RUN
LAMP TEST
NEXT LINE
RESET
8
9
A
C
4
5
6
7
0
1
2
3
STOW
UP
LEFT
CENTER
RIGHT
ACTION
ON
OFF

ARR82-27973

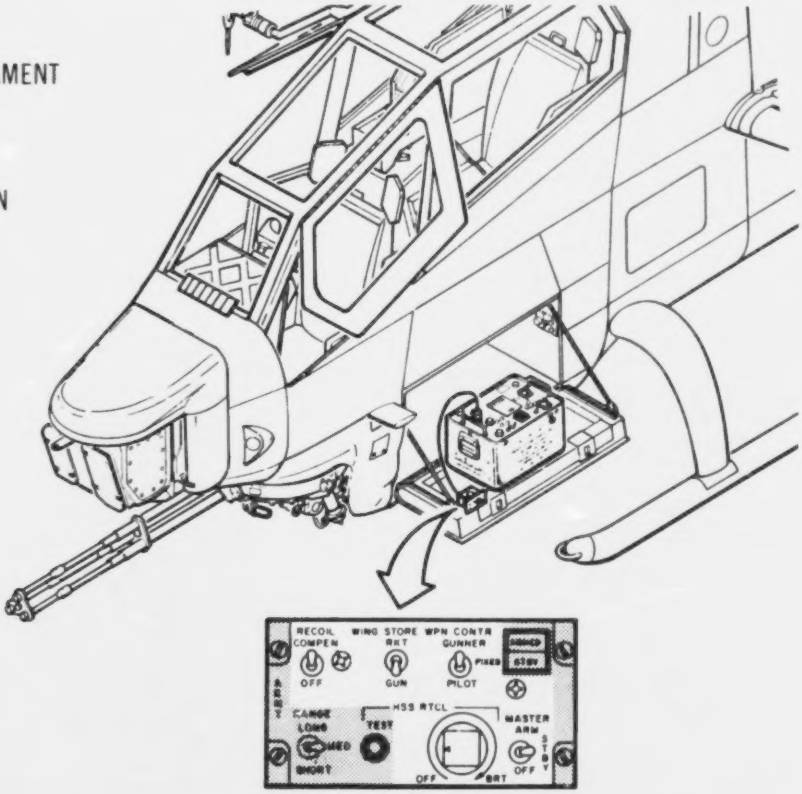
3-38. CHECKOUT OF PILOT ARMAMENT CONTROL PANEL (cont)

7. ON TEST SET, PRESS A, 0, AND RUN KEYS.
   a. Automatic test sequence runs.
   b. PASS or FAIL indicator lights.
   c. If FAIL indicator lights, pilot armament control panel requires repair at next higher level of maintenance. If PASS indicator lights, panel checks good.
8. IF PILOT ARMAMENT CONTROL PANEL CHECKS GOOD, GO TO NEXT STEP. IF PANEL FAILS, GO TO STEP 23.


TEST SET
ELECTRONIC SYSTEMS,
XM137
J3
J4
J5
J2
J6
J1
RTCL
REFERENCE
CODE
A0
DANGER
EL
PASS
FAIL
POWER
AC
DC
ON
OFF
ON
OFF
RUN
LAMP TEST
NEXT LINE
RESET
8
9
A
C
4
5
6
7
0
1
2
3
STOW
UP
LEFT
CENTER
RIGHT
ACTION
ON
OFF
AZ

ARR82-27974

9. SET SWITCHES ON PILOT ARMAMENT CONTROL PANEL AS FOLLOWS:
   WPN CONTR to GUNNER
   MASTER ARM to STBY
   RECOIL COMPEN TO COMPEN
   WING STORE to GUN
   HSS RTCL to ON (but not rotated to BRT)


RECOIL
COMPEN
OFF
WING STORE
RKT
GUN
WPN CONTR
GUNNER
FIXED
PILOT
STBY
ARMT
RANGE
LONG
MED
SHORT
HSS RTCL
TEST
OFF
BRT
MASTER
ARM
STBY
OFF

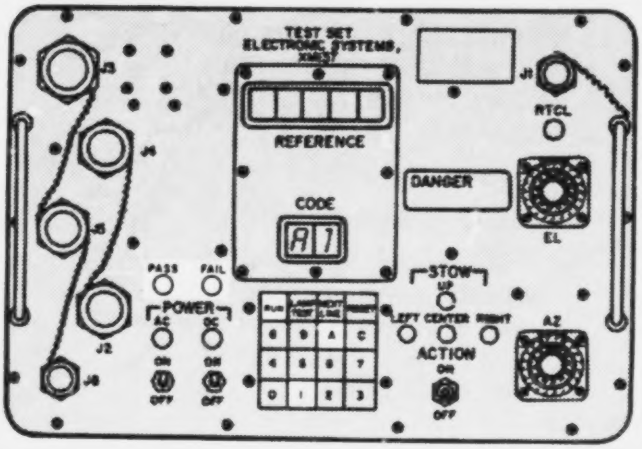
PILOT ARMAMENT CONTROL PANEL

ARR82-27975

CHECKOUT OF PILOT ARMAMENT CONTROL PANEL (cont)

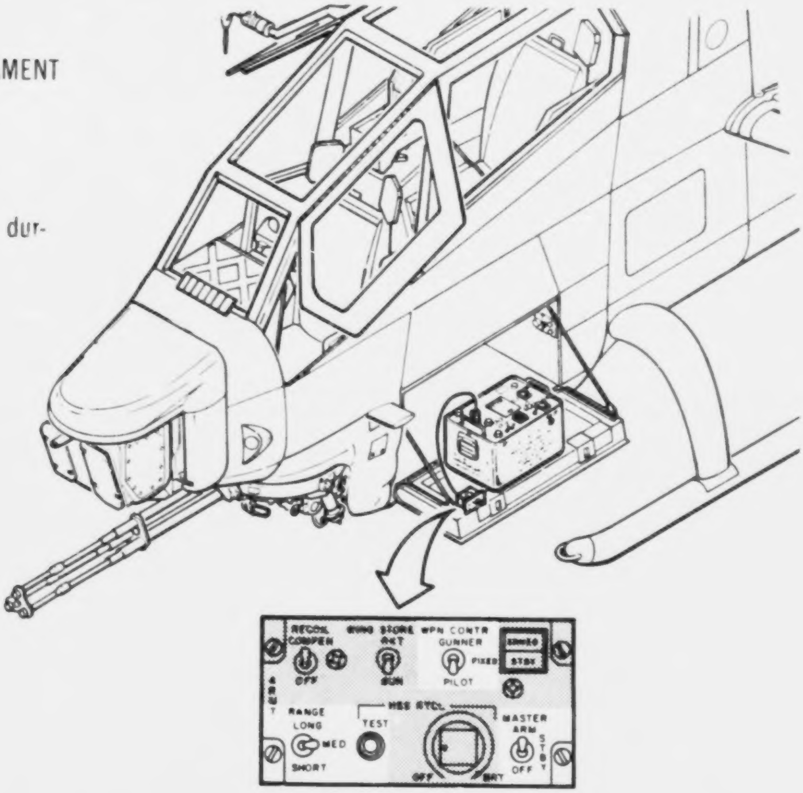
10. ON TEST SET, PRESS A, 1, AND RUN KEYS.
    a. Automatic test sequence runs.
    b. PASS or FAIL indicator lights.
    c. If FAIL indicator lights, pilot armament control panel requires repair at next higher level of maintenance. If PASS indicator lights, panel checks good.

11. IF PILOT ARMAMENT CONTROL PANEL CHECKS GOOD, GO TO NEXT STEP. IF PANEL FAILS, GO TO STEP 23.


TEST SET
ELECTRONIC SYSTEMS,
XM137
REFERENCE
CODE
A1
DANGER
J1
J2
J3
J4
J5
J6
RTCL
EL
AZ
PASS
FAIL
POWER
AC
DC
ON
OFF
RUN
STOW
UP
LEFT
CENTER
RIGHT
ACTION
0
1
2
3
4
5
6
7
8
9
A
C

ARR82 27976

12. SET SWITCHES ON PILOT ARMAMENT CONTROL PANEL AS FOLLOWS:
    WPN CONTR to PILOT
    MASTER ARM to ARM
    RANGE to MED
    HSS RTCL TEST held pressed during test

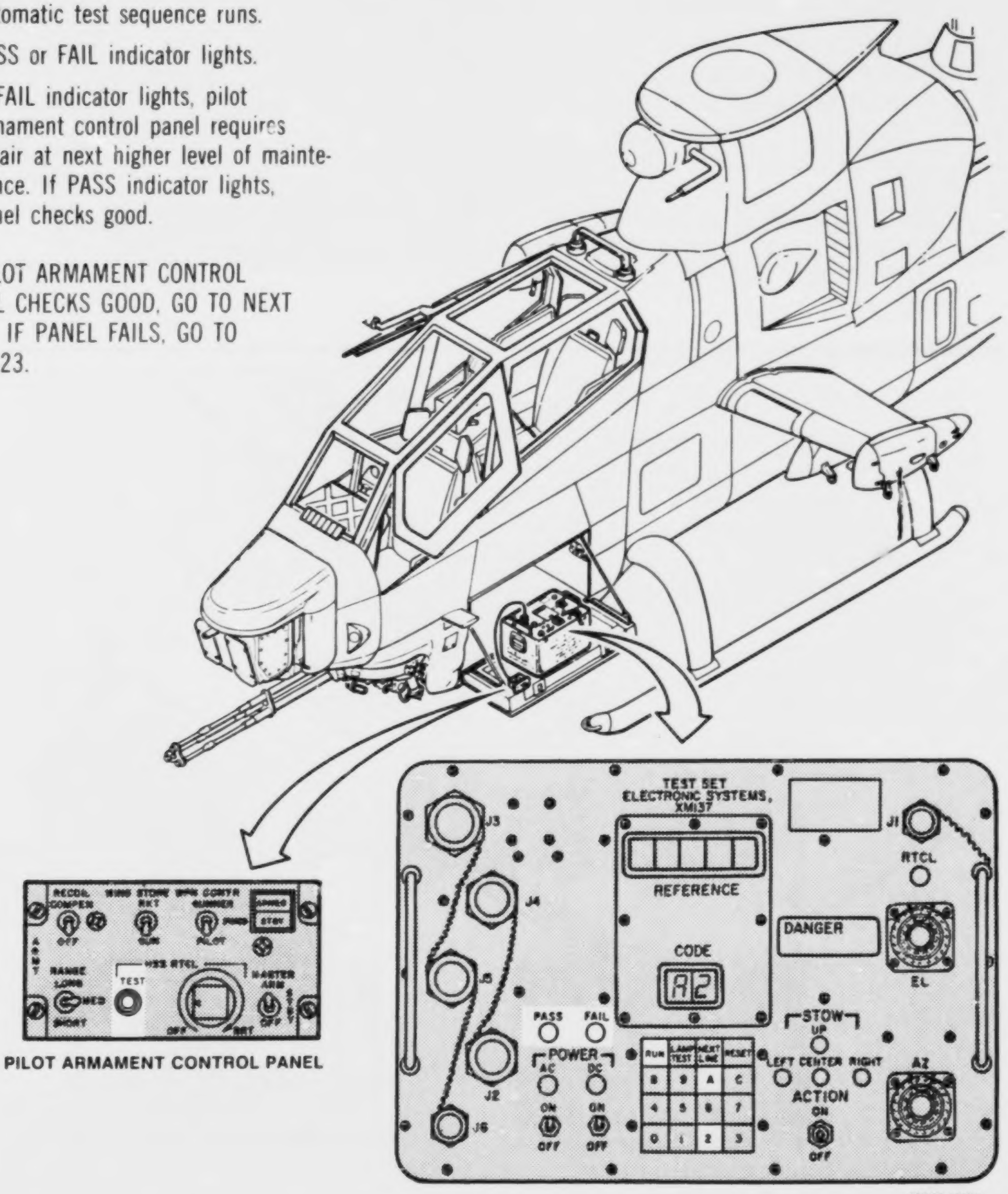

RECOIL COMPEN
OFF
WING STORE
RKT
GUN
WPN CONTR
GUNNER
FIXED
PILOT
ARMED
STBY
ARM
RANGE
LONG
MED
SHORT
HSS RTCL
TEST
OFF
BRT
MASTER
ARM
STBY
OFF

PILOT ARMAMENT CONTROL PANEL

ARR82 27977

3-38. CHECKOUT OF PILOT ARMAMENT CONTROL PANEL (cont)

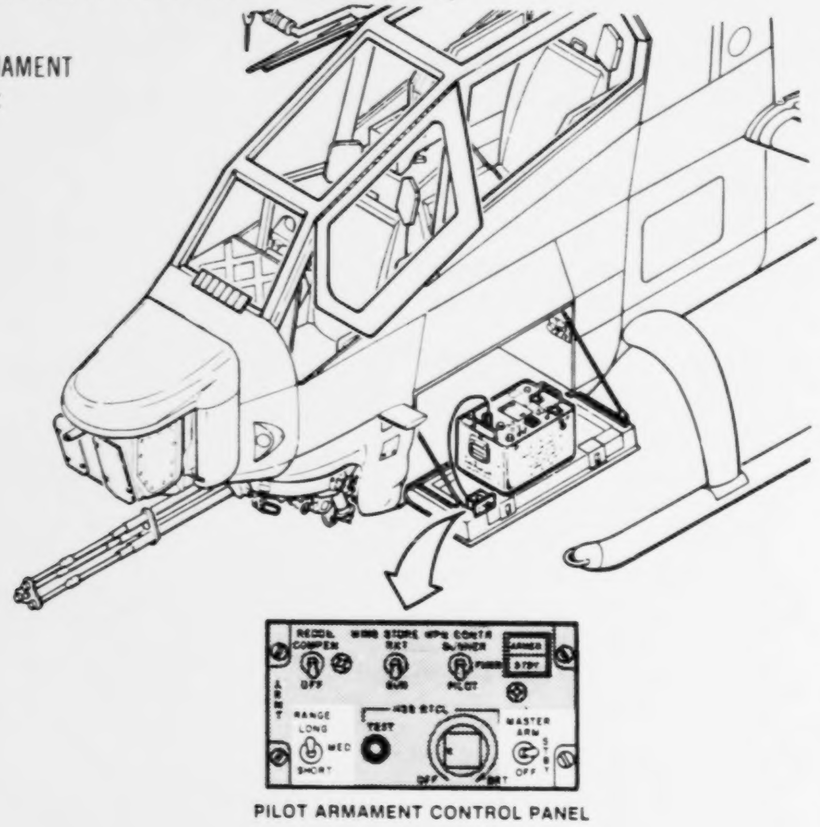
13. WITH HSS RTCL PUSHBUTTON ON PILOT ARMAMENT CONTROL PANEL PRESSED, PRESS A, 2, AND RUN KEYS ON TEST SET.
    a. Automatic test sequence runs.
    b. PASS or FAIL indicator lights.
    c. If FAIL indicator lights, pilot armament control panel requires repair at next higher level of maintenance. If PASS indicator lights, panel checks good.
14. IF PILOT ARMAMENT CONTROL PANEL CHECKS GOOD, GO TO NEXT STEP. IF PANEL FAILS, GO TO STEP 23.


PILOT ARMAMENT CONTROL PANEL
RECOIL COMPEN
WING STORE
RKT
WPN CONTR
GUNNER
PILOT
OFF
GUN
RANGE
LONG
SHORT
MED
HSS RTCL
TEST
MASTER ARM
OFF
TEST SET ELECTRONIC SYSTEMS, XM137
J1
J2
J3
J4
J5
J6
RTCL
REFERENCE
DANGER
CODE
A2
EL
PASS
FAIL
POWER
AC
DC
ON
OFF
RUN
LAMP TEST
NEXT LINE
RESET
8
9
A
C
4
5
6
7
0
1
2
3
STOW
UP
LEFT
CENTER
RIGHT
ACTION
ON
OFF
AZ
ARR82-27978

CHECKOUT OF PILOT ARMAMENT CONTROL PANEL (cont)

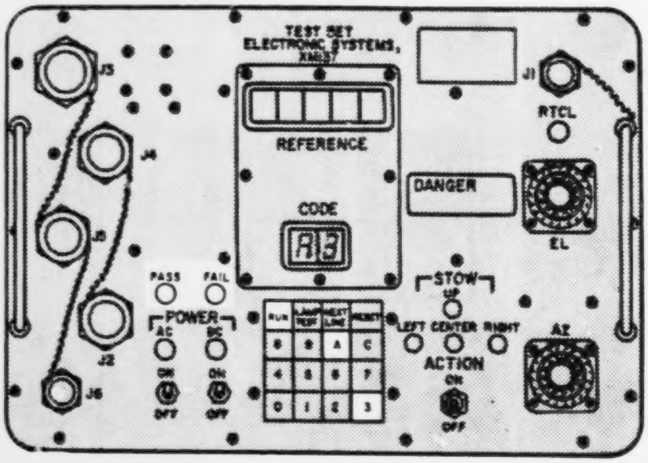
15. SET SWITCHES ON PILOT ARMAMENT CONTROL PANEL AS FOLLOWS:

    MASTER ARM to STBY
    RANGE to LONG


RECOIL COMPEN
OFF
WING STORE RKT
WPN CONTR GUNNER
PILOT
ARMED
STBY
ARMT
RANGE
LONG
MED
SHORT
TEST
RTCL
OFF
BRT
MASTER ARM
STBY
OFF
PILOT ARMAMENT CONTROL PANEL

ARR82-27979

16. ON TEST SET, PRESS A, 3, AND RUN KEYS.
    a. Automatic test sequence runs.
    b. PASS or FAIL indicator lights.
    c. If FAIL indicator lights, pilot armament control panel requires repair at next higher level of maintenance. If PASS indicator lights, panel checks good.


TEST SET
ELECTRONIC SYSTEMS,
J3
J4
J5
J2
J6
J1
RTCL
REFERENCE
DANGER
CODE
A3
EL
PASS
FAIL
POWER
AC
DC
ON
OFF
ON
OFF
RUN
LAMP TEST
NEXT LINE
RESET
A
C
4
5
6
7
0
1
2
3
STOW
UP
LEFT
CENTER
RIGHT
ACTION
ON
OFF
AZ

17. IF PILOT ARMAMENT CONTROL PANEL CHECKS GOOD, GO TO NEXT STEP. IF PANEL FAILS CHECK, GO TO STEP 23.

ARR82-27980

3-38. CHECKOUT OF PILOT ARMAMENT CONTROL PANEL (cont)

18. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO ARM.

19. ON TEST SET, PRESS C, 0, AND RUN KEYS.

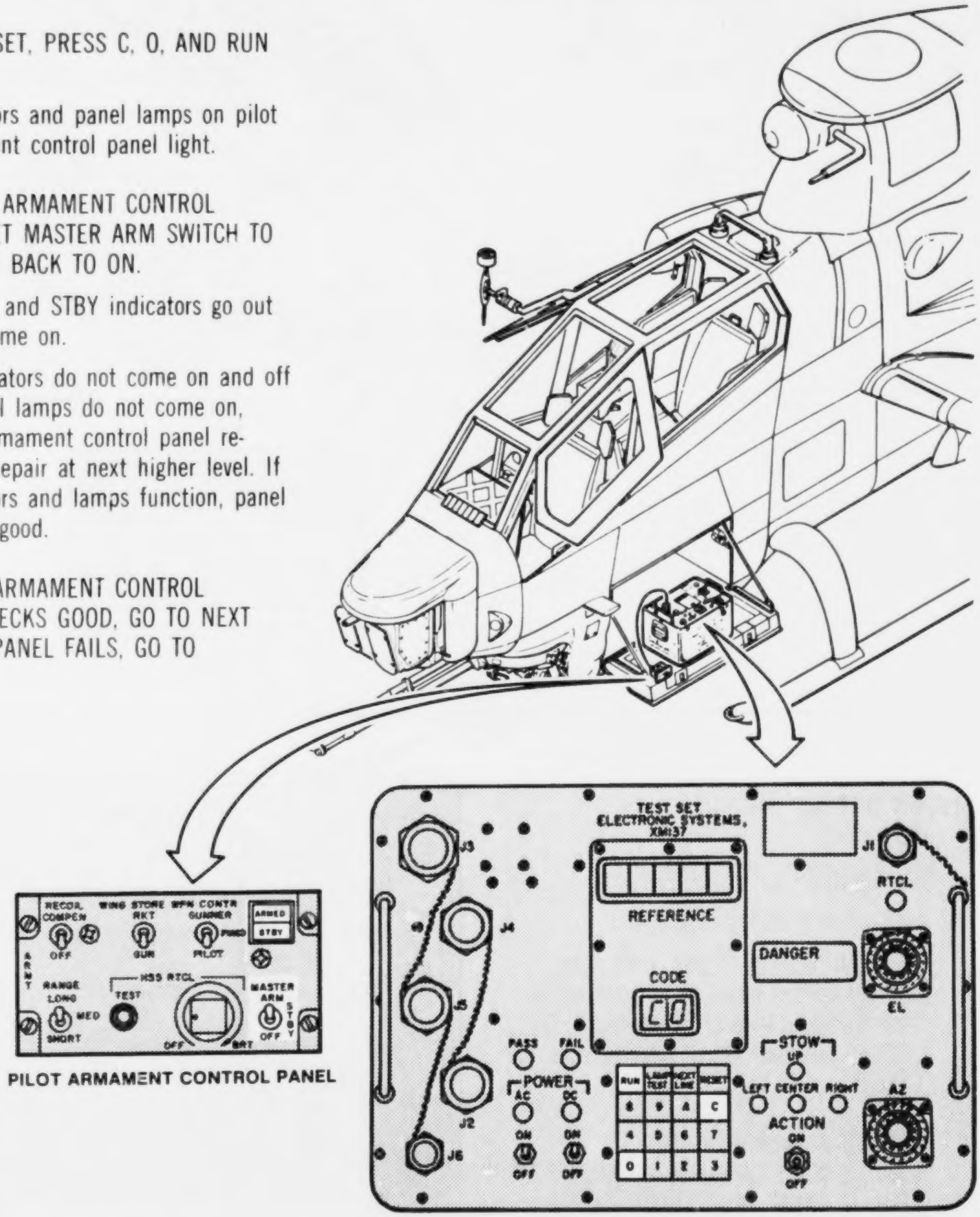
    Indicators and panel lamps on pilot armament control panel light.

20. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO OFF, THEN BACK TO ON.

    a. ARMED and STBY indicators go out then come on.

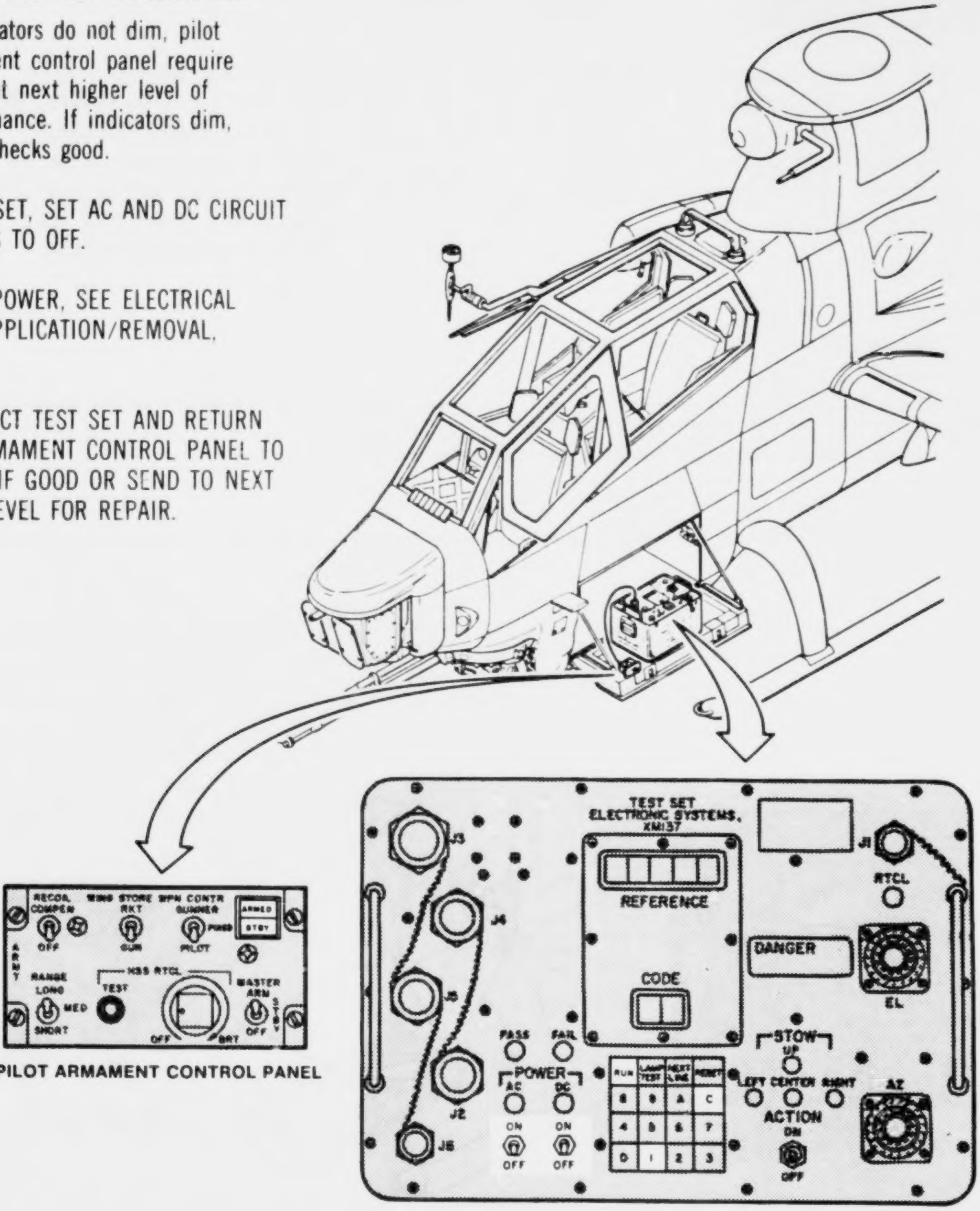
    b. If indicators do not come on and off or panel lamps do not come on, pilot armament control panel requires repair at next higher level. If indicators and lamps function, panel checks good.

21. IF PILOT ARMAMENT CONTROL PANEL CHECKS GOOD, GO TO NEXT STEP. IF PANEL FAILS, GO TO STEP 23.


RECOIL COMPEN
OFF
WING STORE
RKT
GUN
WPN CONTR
GUNNER
FIXED
PILOT
ARMED
STBY
ARMT
RANGE
LONG
MED
SHORT
M35 RTCL
TEST
OFF
BRT
MASTER
ARM
STBY
OFF
PILOT ARMAMENT CONTROL PANEL
TEST SET
ELECTRONIC SYSTEMS,
XM137
J3
J4
J5
J2
J6
J1
RTCL
REFERENCE
DANGER
CODE
C0
EL
AZ
PASS
FAIL
POWER
AC
DC
ON
OFF
RUN
LAMP TEST
NEXT LINE
RESET
8
9
A
C
4
5
6
7
0
1
2
3
STOW
UP
LEFT
CENTER
RIGHT
ACTION
ON
OFF
ARR82-27981

CHECKOUT OF PILOT ARMAMENT CONTROL PANEL (cont)

22. ON TEST SET, PRESS C, 1, AND RUN KEYS.
    a. ARMED and STBY indicators dim.
    b. If indicators do not dim, pilot armament control panel require repair at next higher level of maintenance. If indicators dim, panel checks good.
23. ON TEST SET, SET AC AND DC CIRCUIT BREAKERS TO OFF.
24. REMOVE POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.
25. DISCONNECT TEST SET AND RETURN PILOT ARMAMENT CONTROL PANEL TO SERVICE, IF GOOD OR SEND TO NEXT HIGHER LEVEL FOR REPAIR.


RECOIL COMPEN
OFF
WING STORE WPN CONTR
RKT
GUN
GUNNER
PILOT
FIXED
ARMED
STBY
ARMT
RANGE
LONG
MED
SHORT
HSS RTCL
TEST
OFF
BRT
MASTER ARM
STBY
OFF
PILOT ARMAMENT CONTROL PANEL
TEST SET ELECTRONIC SYSTEMS, XM137
J3
J4
J5
J2
J6
J1
REFERENCE
CODE
DANGER
RTCL
EL
AZ
PASS
FAIL
POWER
AC
DC
ON
OFF
RUN
LAMP TEST
NEXT LINE
RESET
8
9
A
C
4
5
6
7
0
1
2
3
STOW
UP
LEFT
CENTER
RIGHT
ACTION
ON
OFF

ARR82 27982

END OF TEST

3-39. CHECKOUT OF INTERFACE CONTROL UNIT

DESCRIPTION

This test covers: On helicopter checkout of interface control unit with test set.

INITIAL SETUP

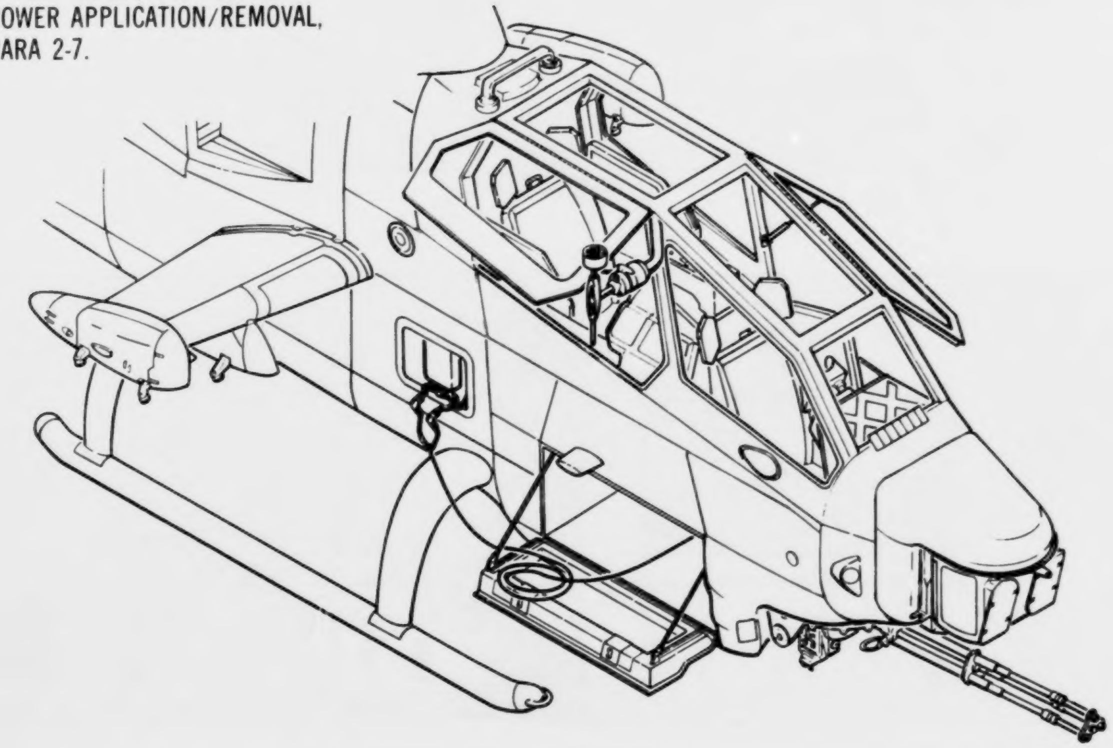
Tools/Test and Support Equipment:
- Tool Set, A/C Armament Repairman: Basic
- Tool Set, A/C Armament Repairman: Supplemental
- Electronics Systems Test Set: M137

Personnel Required:
- 68J Aircraft Fire Control Repairer

Equipment Conditions:
- HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP performed, para 2-6.
- Test set cables W1 and W20 connected, see TEST SET CABLE CONNECTIONS, para 3-17.

CHECKOUT OF INTERFACE CONTROL UNIT

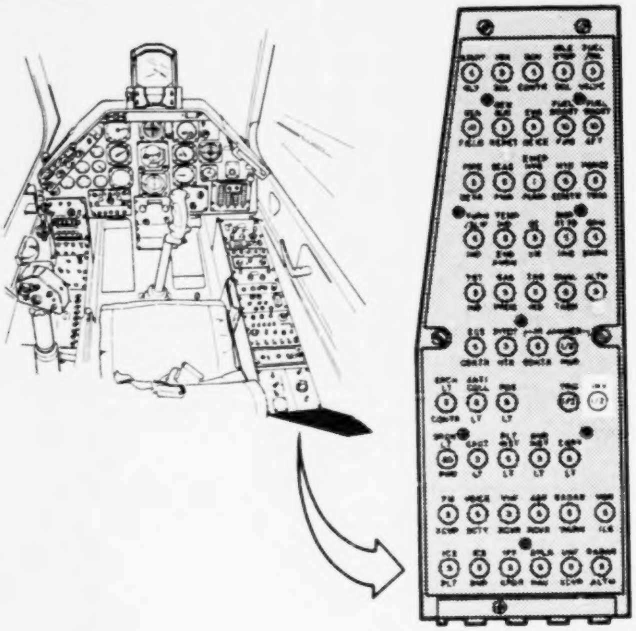
1. APPLY POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.



ARR82-28009

CHECKOUT OF INTERFACE CONTROL UNIT (cont)

2. CLOSE INV CIRCUIT BREAKER ON DC CIRCUIT BREAKER PANEL.

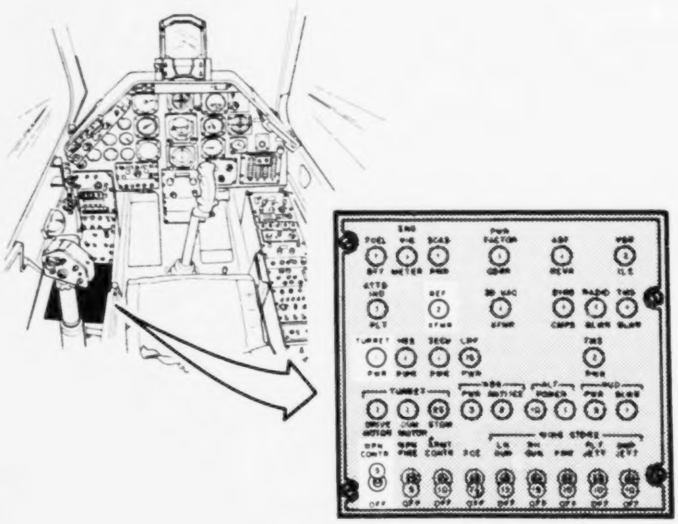


DC CIRCUIT BREAKER PANEL

ARR82 28010

3. CLOSE FOLLOWING CIRCUIT BREAKERS ON AC/ARMAMENT CIRCUIT BREAKER PANEL:

   REF XFMR
   WPN CONTR
   TURRET PWR

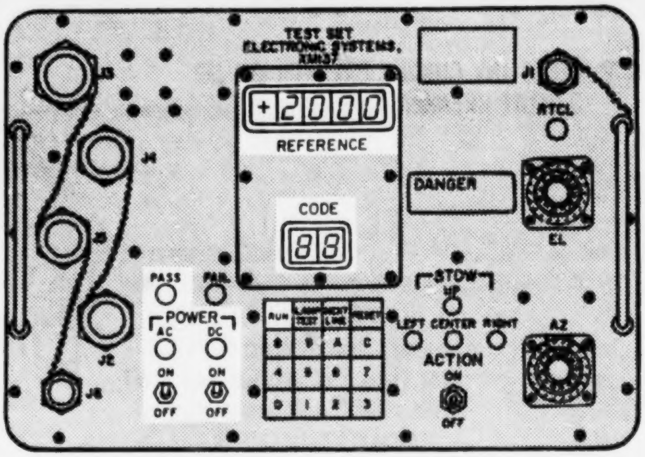


AC / ARMAMENT CIRCUIT BREAKER PANEL

ARR82 28011

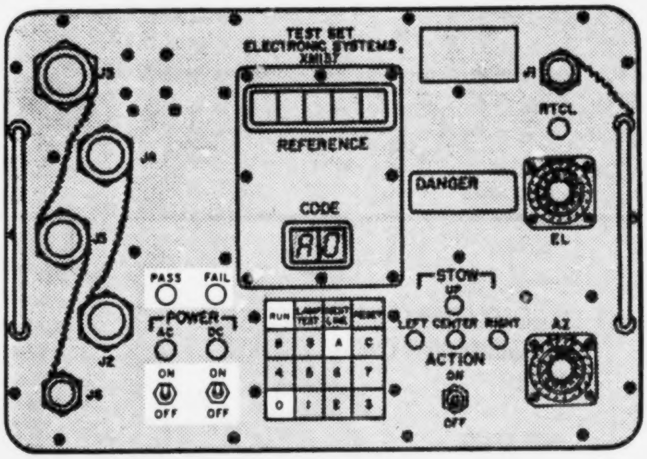
3-39. CHECKOUT OF INTERFACE CONTROL UNIT (cont)

4. ON TEST SET, SET AC AND DC CIRCUIT BREAKERS TO ON.
   a. AC and DC power indicators light.
   b. 8's appear in REFERENCE and CODE displays.
   c. PASS indicator lights.
5. ON TEST SET, PRESS RUN KEY.
   + 2000 appears in REFERENCE display.


TEST SET
ELECTRONIC SYSTEMS,
+2000
REFERENCE
CODE
88
DANGER
J1
J2
J3
J4
J5
J6
RTCL
EL
AZ
STOW
UP
LEFT
CENTER
RIGHT
ACTION
ON
OFF
PASS
FAIL
POWER
AC
DC
ON
ON
OFF
OFF
RUN
LAMP TEST
NEXT LINE
RESET
8
9
A
C
4
5
6
7
0
1
2
3

ARR82-28012

6. ON TEST SET, PRESS A, 0, AND RUN KEYS.
   a. Automatic test sequence runs.
   b. PASS or FAIL indicator lights.
   c. If FAIL indicator lights, interface control unit requires repair at next higher level of maintenance. If PASS indicator lights, unit checks good.
7. ON TEST SET, SET AC AND DC CIRCUIT BREAKERS TO OFF.


TEST SET
ELECTRONIC SYSTEMS,
REFERENCE
CODE
A0
DANGER
J1
J2
J3
J4
J5
J6
RTCL
EL
AZ
STOW
UP
LEFT
CENTER
RIGHT
ACTION
ON
OFF
PASS
FAIL
POWER
AC
DC
ON
ON
OFF
OFF
RUN
LAMP TEST
NEXT LINE
RESET
8
9
A
C
4
5
6
7
0
1
2
3

ARR82-28013

8. REMOVE POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.
9. DISCONNECT TEST SET CABLES.
10. RETURN INTERFACE CONTROL UNIT TO SERVICE, IF GOOD, OR SEND TO NEXT HIGHER LEVEL FOR REPAIR.

END OF TEST

3-40. CHECKOUT OF ACQUISITION SWITCH

DESCRIPTION

This test covers: On helicopter checkout of acquisition switch.

INITIAL SETUP

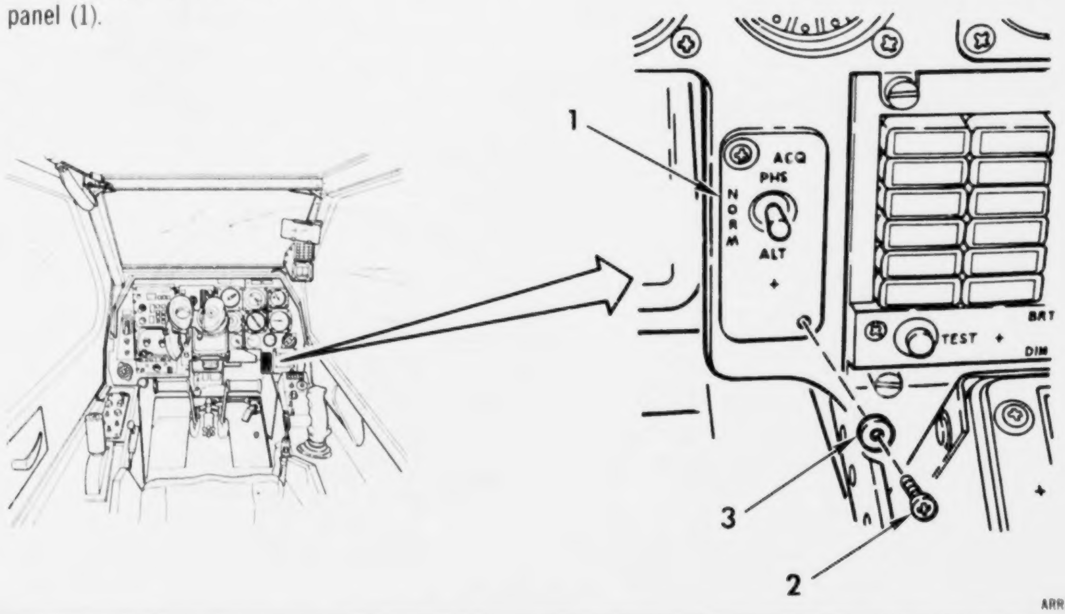
Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental
  Multimeter, AN/USM-223

Personnel Required:
  68J Aircraft Fire Control
    Repairer

Equipment Conditions:
  HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP performed, para 2-6.

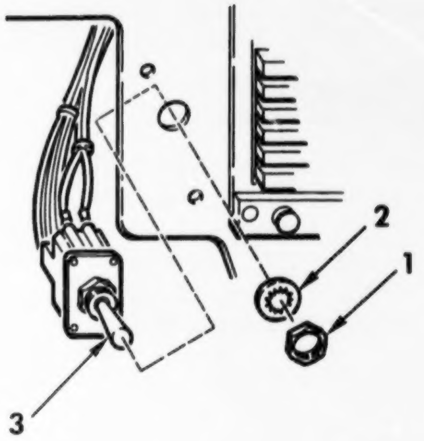
CHECKOUT OF ACQUISITION SWITCH

1. REMOVE ACQUISITION SWITCH PANEL (1).
   a. Remove two screws (2) and two washers (3).
   b. Remove acquisition switch panel (1).



3-40. CHECKOUT OF ACQUISITION SWITCH (cont)

2. REMOVE NUT (1), LOCKWASHER (2), AND PULL SWITCH (3) AWAY FROM INSTRUMENT PANEL.

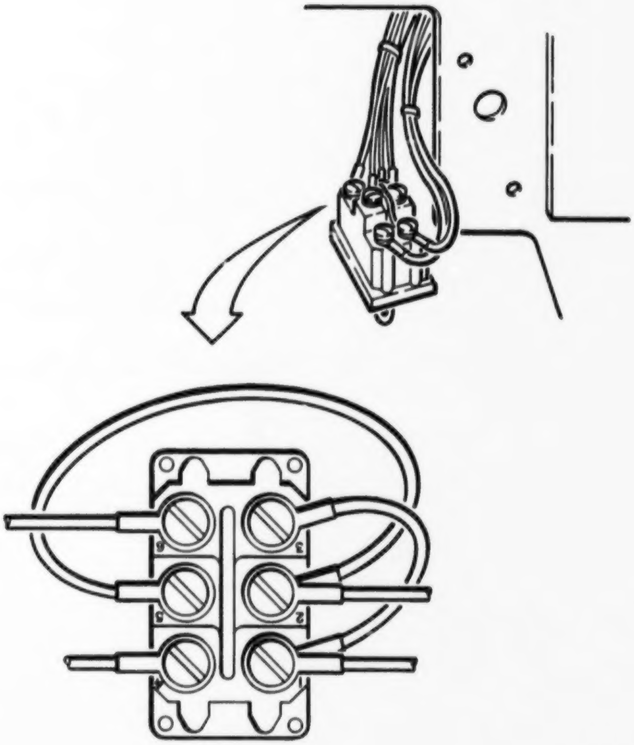


ARR82-28114

3. PERFORM CONTINUITY CHECK IN ACCORDANCE WITH THE FOLLOWING TABLE.

Switch Position	Terminal From	To	Results
PHS	2	1 and 4	Continuity
ALT	2	1 and 6	Continuity
NORM	2	1,4 and 6	Open

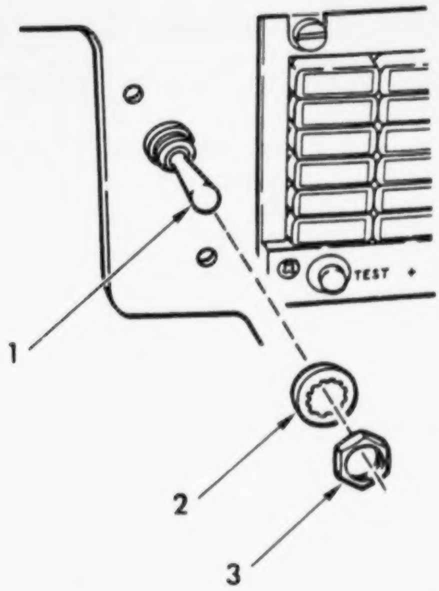
Replace switch failing check.



ARR82-28115

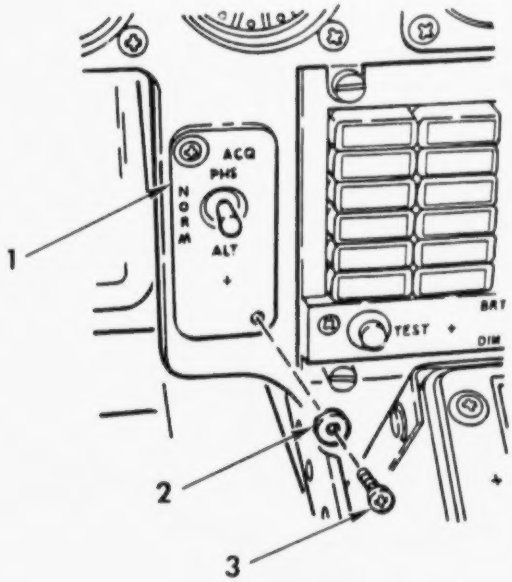
CHECKOUT OF ACQUISITION SWITCH (cont)

4. POSITION SWITCH (1) IN INSTRUMENT PANEL, INSTALL LOCKWASHER (2), AND INSTALL NUT (3).



ARR82-28116

5. INSTALL ACQUISITION SWITCH PANEL (1).
   a. Position acquisition switch panel (1) on instrument panel.
   b. Install two washers (2) and two screws (3).


ACQ
PHS
NORM
ALT
TEST
BRT
DIM
1
2
3

ARR82-28117

END OF TEST

3-40.1. CHECKOUT OF LOGIC RELAY ASSEMBLY

DESCRIPTION

This task covers: On helicopter checkout of logic relay assembly with test set.

INITIAL SETUP

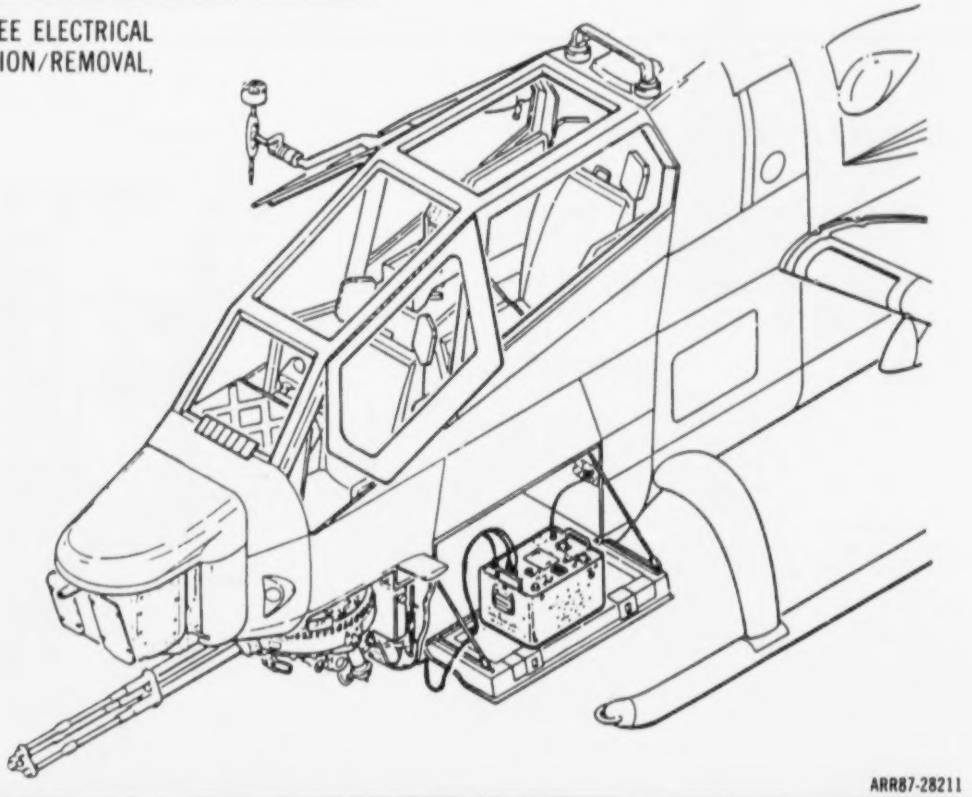
Tools/Test and Support Equipment:
- Tool Set, A/C Armament Repairman: Basic
- Tool Set, A/C Armament Repairman: Supplemental
- Electronics Systems Test Set: M137

Personnel Required:
- 68J Aircraft Fire Control Repairer

Equipment Conditions:
- HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP performed, para 2-6.
- Test set cables W1 and W24 connected, see TEST SET CABLE CONNECTIONS, para 3-17.

CHECKOUT OF LOGIC RELAY ASSEMBLY

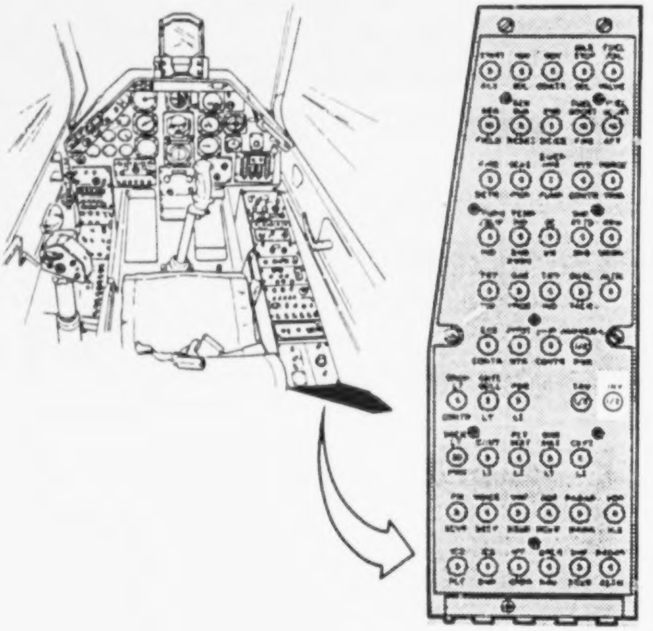
1. APPLY POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.



ARR87-28211

CHECKOUT OF LOGIC RELAY ASSEMBLY (cont)

2. CLOSE INV CIRCUIT BREAKER ON DC CIRCUIT BREAKER PANEL.

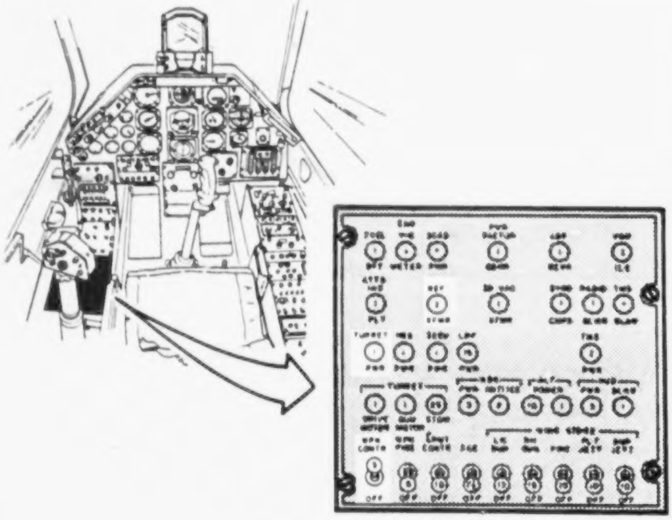


DC CIRCUIT BREAKER PANEL

ARR87-28010

3. CLOSE FOLLOWING CIRCUIT BREAKERS ON AC/ARMAMENT CIRCUIT BREAKER PANEL:

   REF XFMR
   WPN CONTR
   TURRET PWR



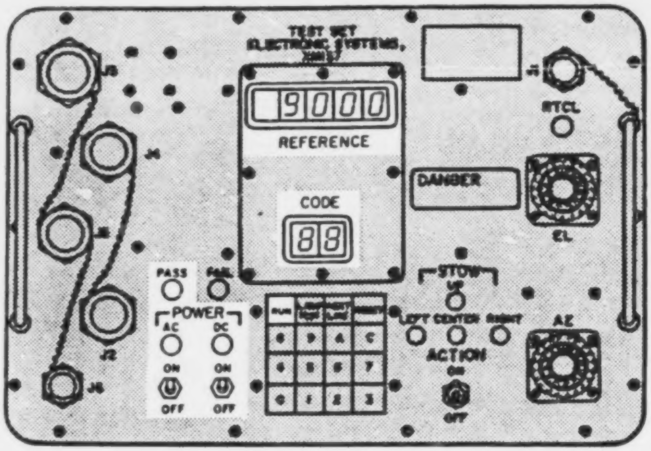
AC / ARMAMENT
CIRCUIT BREAKER PANEL

ARR87-28011

3-40.1. CHECKOUT OF LOGIC RELAY ASSEMBLY (cont)

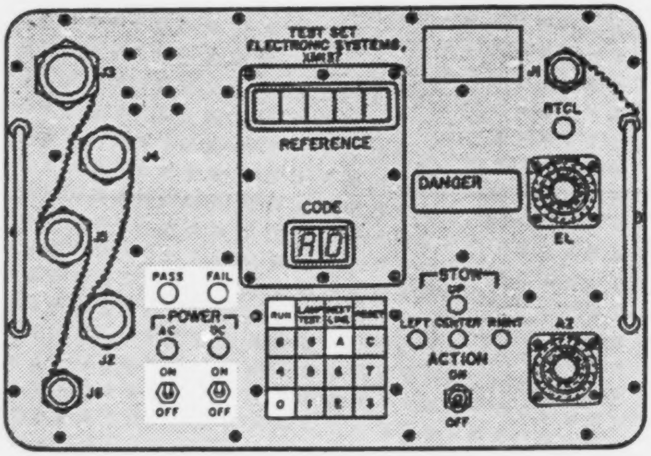
4. ON TEST SET, SET POWER AC AND DC POWER CIRCUIT BREAKERS TO ON.
    - a. AC and DC POWER indicators light.
    - b. 8's appear in REFERENCE and CODE displays.
    - c. PASS indicator lights.
5. ON TEST SET, PRESS RUN KEY.

    + 9000 appears in REFERENCE display.


TEST SET
ELECTRONIC SYSTEMS,
J3
J1
9000
REFERENCE
RTCL
J4
DANGER
CODE
88
J5
EL
PASS
FAIL
STOW
UP
POWER
AC
DC
LEFT
CENTER
RIGHT
ACTION
AZ
J2
ON
ON
ON
J6
OFF
OFF
OFF

ARR87-28212

6. ON TEST SET, PRESS A, 0, AND RUN KEYS.
    - a. Automatic test sequence runs.
    - b. PASS or FAIL indicator lights.
    - c. If PASS indicator lights, check pilot cyclic stick action and trigger switches. See TM 55-1520-236-23.
    - d. If FAIL indicator lights, logic relay assembly requires repair at next higher level of maintenance.
7. ON TEST SET, SET AC AND DC CIRCUIT BREAKERS TO OFF.


TEST SET
ELECTRONIC SYSTEMS,
J3
J1
RTCL
REFERENCE
J4
DANGER
CODE
A0
J5
EL
PASS
FAIL
STOW
UP
POWER
AC
DC
RUN
LEFT
CENTER
RIGHT
A
C
7
ACTION
0
1
2
3
AZ
J2
ON
ON
ON
J6
OFF
OFF
OFF

ARR87-28213

8. REMOVE POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.
9. DISCONNECT TEST SET CABLES.
10. RETURN LOGIC RELAY ASSEMBLY TO SERVICE IF GOOD, OR SEND TO NEXT HIGHER LEVEL FOR REPAIR.

END OF TEST

3-40.2. CHECKOUT OF TURRET BUFFER AMPLIFIER

DESCRIPTION

This test covers: On helicopter checkout of turret buffer amplifier with test set.

INITIAL SETUP

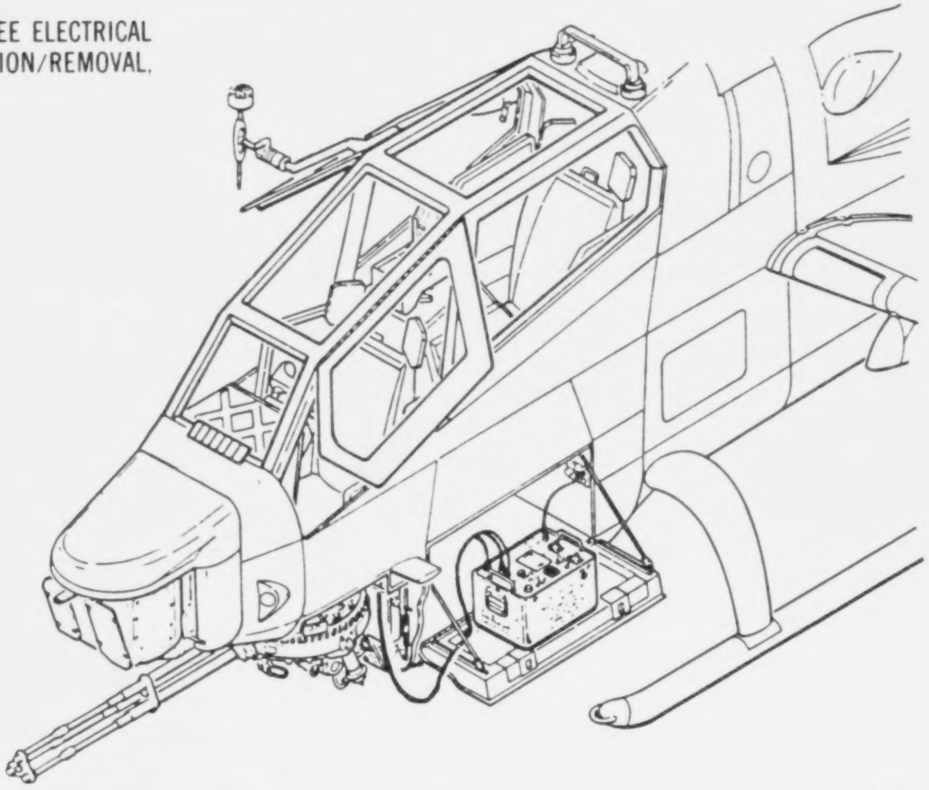
Tools/Test and Support Equipment:
- Tool Set, A/C Armament Repairman: Basic
- Tool Set, A/C Armament Repairman: Supplemental
- Electronics Systems Test Set: M137

Personnel Required:
- 68J Aircraft Fire Control Repairer

Equipment Conditions:
- HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP performed, para 2-6.
- Test set cables W1 and W25 connected, see TEST SET CABLE CONNECTIONS, para 3-17.

CHECKOUT OF TURRET BUFFER AMPLIFIER

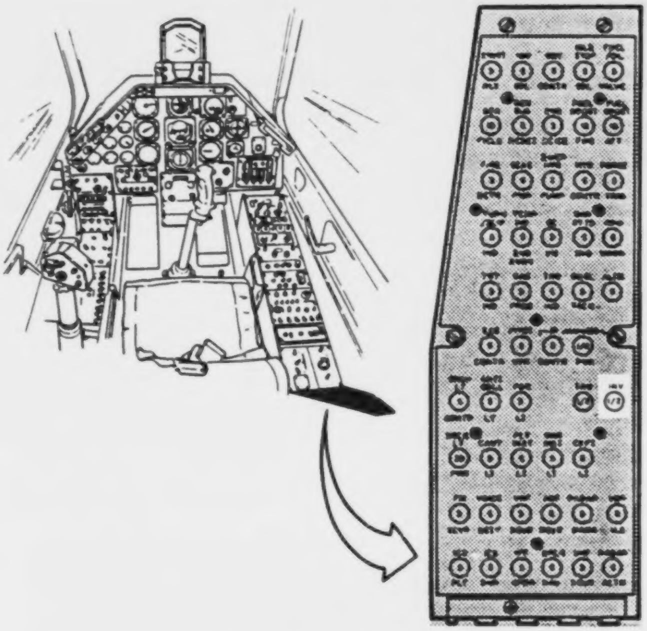
1. APPLY POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.



ARR87-26696

3-40.2 CHECKOUT OF TURRET BUFFER AMPLIFIER (cont)

2. CLOSE INV CIRCUIT BREAKER ON DC CIRCUIT BREAKER PANEL.

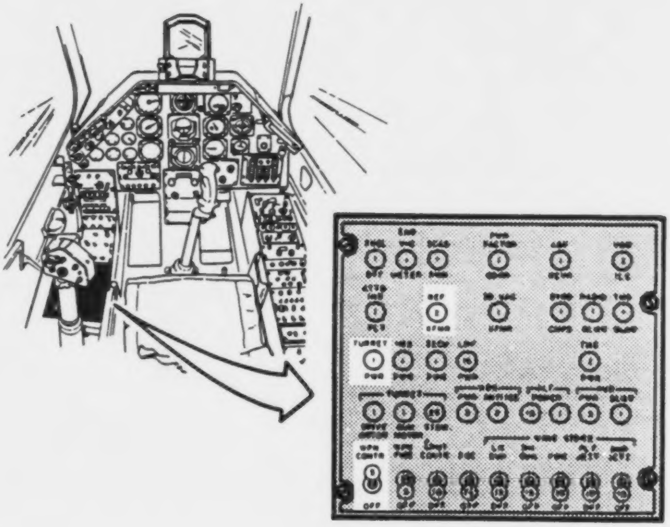


DC CIRCUIT BREAKER PANEL

ARR87-28214

3. CLOSE FOLLOWING CIRCUIT BREAKERS ON AC/ARMAMENT CIRCUIT BREAKER PANEL:

   REF XFMR
   WPN CONTR
   TURRET PWR

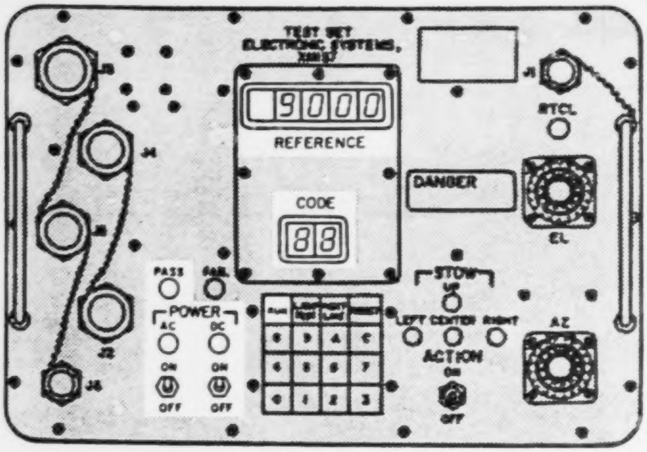


AC / ARMAMENT
CIRCUIT BREAKER PANEL

ARR87-28215

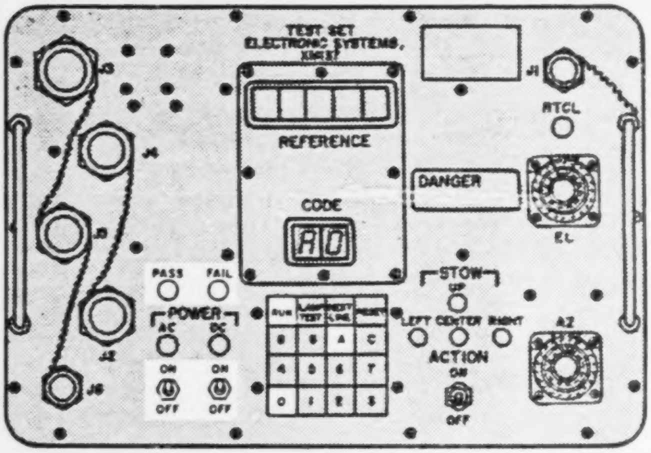
CHECKOUT OF TURRET BUFFER AMPLIFIER (cont)

4. ON TEST SET, SET AC AND DC CIRCUIT BREAKERS TO ON.
   a. AC and DC power indicators light.
   b. 8's appear in REFERENCE and CODE displays.
   c. PASS indicator lights.
5. ON TEST SET, PRESS RUN KEY.
   + 9000 appears in REFERENCE display.


TEST SET ELECTRONIC SYSTEMS, XM187
J3
J4
J5
J2
J6
J1
9000
REFERENCE
CODE
88
RTCL
DANGER
EL
PASS
FAIL
POWER
AC
DC
ON
OFF
STOW
UP
LEFT
CENTER
RIGHT
ACTION
AZ

ARR87-28012

6. ON TEST SET, PRESS A, 0, AND RUN KEYS.
   a. Automatic test sequence runs.
   b. PASS or FAIL indicator lights.
   c. If FAIL indicator lights, turret buffer amplifier requires repair at next higher level of maintenance. If PASS indicator lights, unit checks good.
7. ON TEST SET, SET AC AND DC CIRCUIT BREAKERS TO OFF.


TEST SET ELECTRONIC SYSTEMS, XM187
J3
J4
J5
J2
J6
J1
REFERENCE
CODE
A0
RTCL
DANGER
EL
PASS
FAIL
POWER
AC
DC
ON
OFF
STOW
UP
LEFT
CENTER
RIGHT
ACTION
AZ

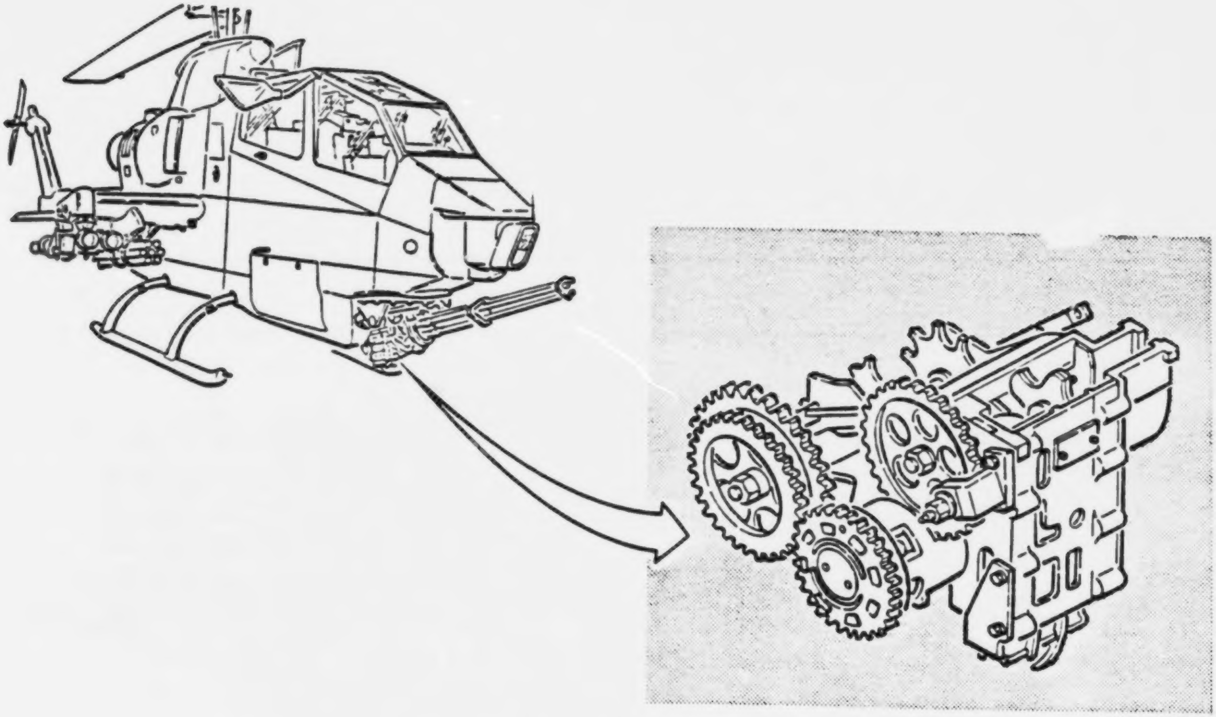
ARR87-28013

8. REMOVE POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.
9. DISCONNECT TEST SET CABLES.
10. RETURN TURRET BUFFER AMPLIFIER TO SERVICE, IF GOOD, OR SEND TO NEXT HIGHER LEVEL FOR REPAIR.

END OF TEST

Section VII. MAINTENANCE OF M89E1 FEEDER

Section Contents	Para
Removal/Installation of M89E1 Feeder	3-41
Repair of M89E1 Feeder	3-42
Checkout of M89E1 Feeder	3-43



3-41. REMOVAL/INSTALLATION OF M89E1 FEEDER

DESCRIPTION

This task covers: Removal and installation.

INITIAL SETUP

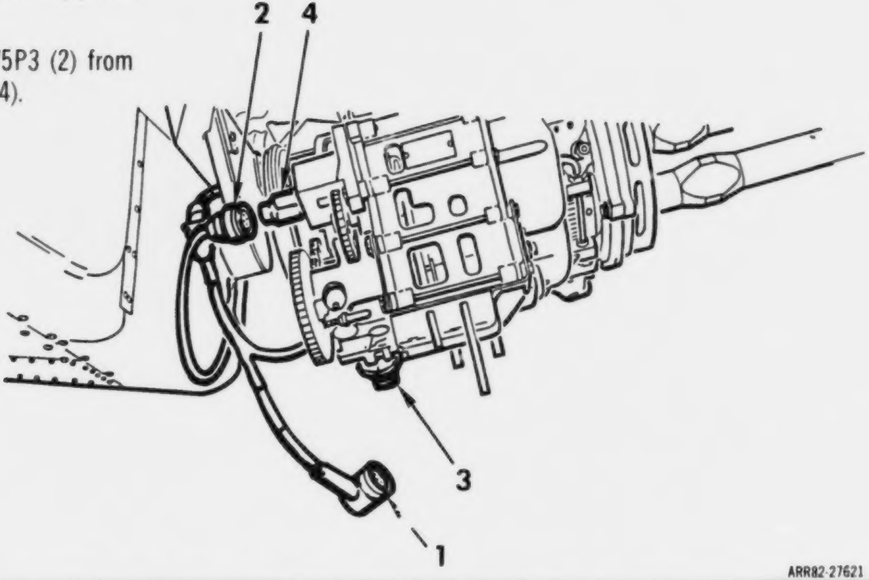
Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental

Personnel Required:
  68M Aircraft Weapon Systems
    Repairer

Equipment Conditions:
  HELICOPTER ARMAMENT SUB-SYSTEM MAINTENANCE SETUP performed, para 2-6.

REMOVAL

1. DISCONNECT CONNECTORS W2P2 (1) AND W5P3 (2).
   a. Disconnect connectors W2P2 (1) from feeder solenoid (3).
   b. Disconnect connector W5P3 (2) from rounds sensing switch (4).

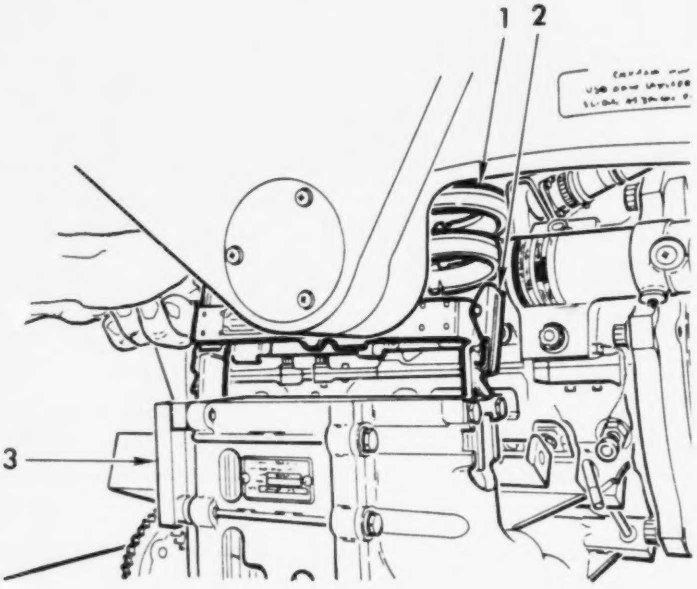


REMOVAL (cont)

2. RELEASE ELEVATION DRIVE MOTOR BRAKE AND MANUALLY LOWER BARREL CLUSTER TO APPROXIMATELY LEVEL POSITION. APPLY ELEVATION DRIVE MOTOR BRAKE.

3. DISCONNECT FEED CHUTE (1).

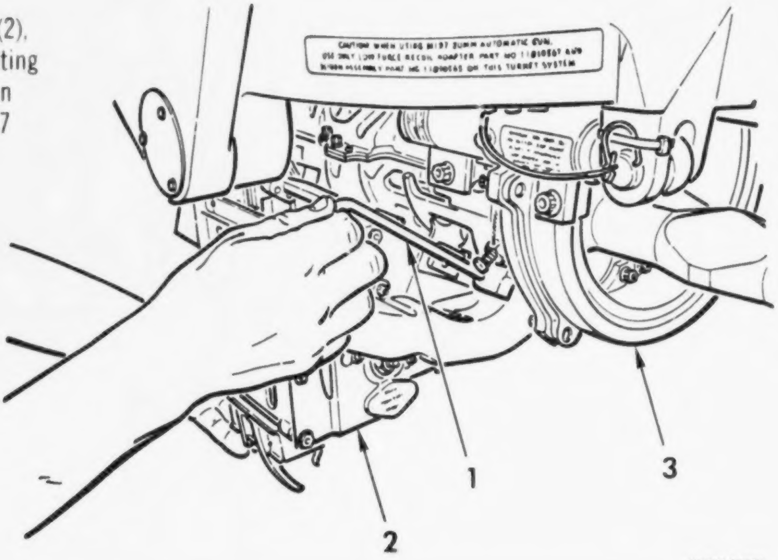
   Depress two chuting clips (2) and disconnect feed chute (1) from M89E1 feeder (3).



ARR82-27622

4. REMOVE MOUNTING PINS (1).

   While supporting M89E1 feeder (2), disengage and remove two mounting pins (1) from M89E1 feeder; then remove M89E1 feeder from M197 gun (3).

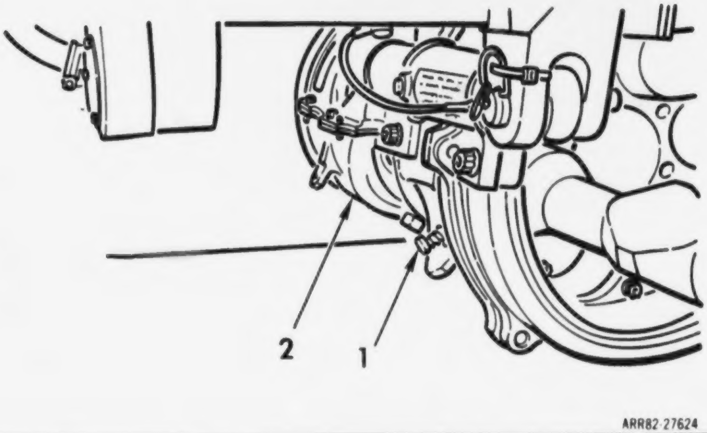


ARR82-27623

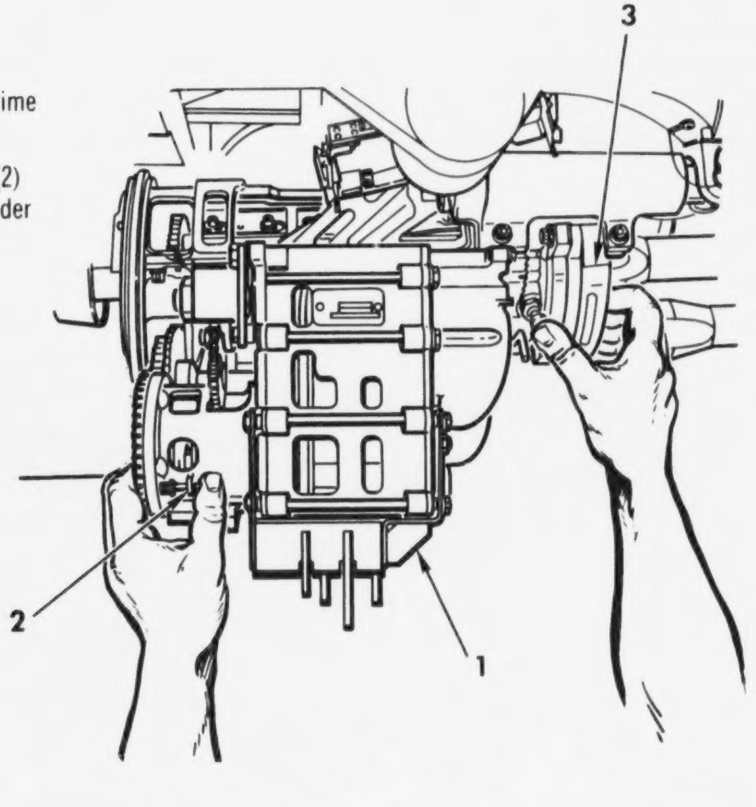
3-41. REMOVAL/INSTALLATION OF M89E1 FEEDER (cont)

INSTALLATION

5. PRESS GUN TIMING PIN (1) AND TIME M197 GUN (2).



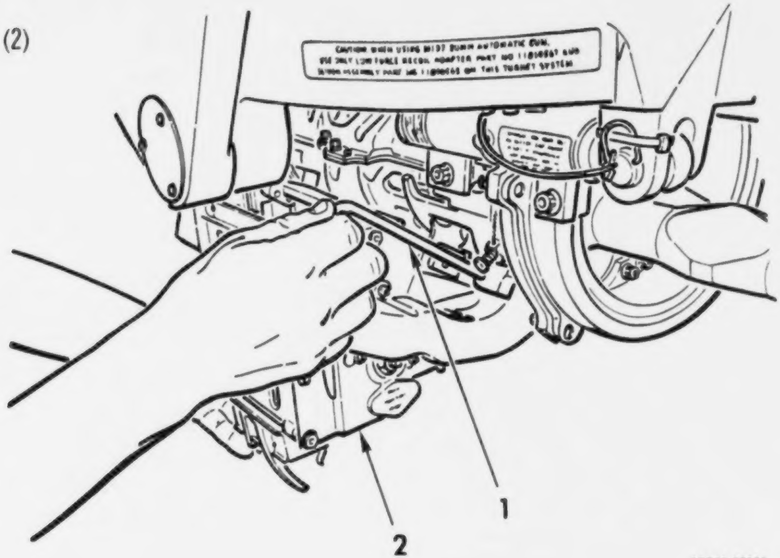
6. INSTALL M89E1 FEEDER (1).
   a. Press feeder timing pin (2) and time M89E1 feeder (1).
   b. While holding feeder timing pin (2) fully depressed, place M89E1 feeder (1) in position on M197 gun (3).



INSTALLATION (cont)

7. INSTALL MOUNTING PINS (1).

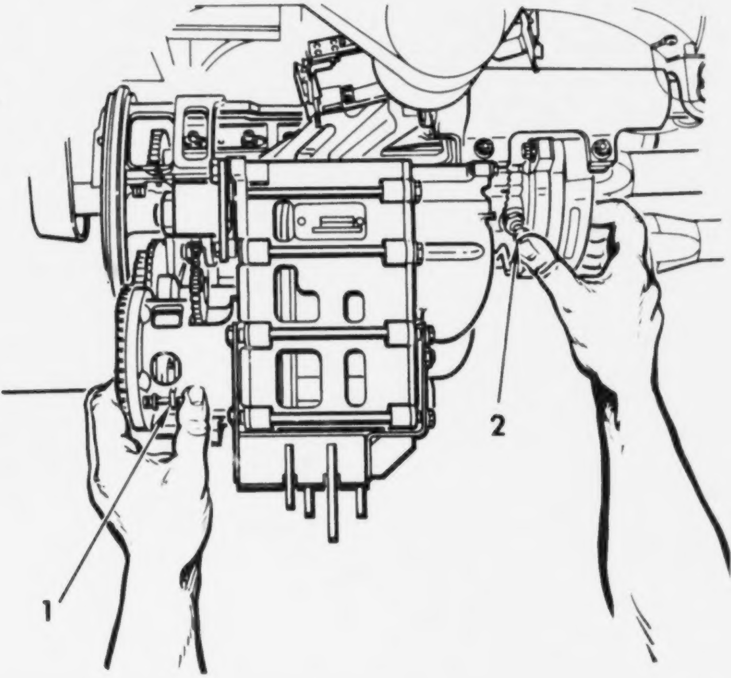
While supporting M89E1 feeder (2) install and lock two mounting pins (1).



ARR82-27626

8. CHECK TIMING.

Check that both M89E1 feeder timing pin (1) and M197 gun timing pin (2) can be fully depressed at the same time.



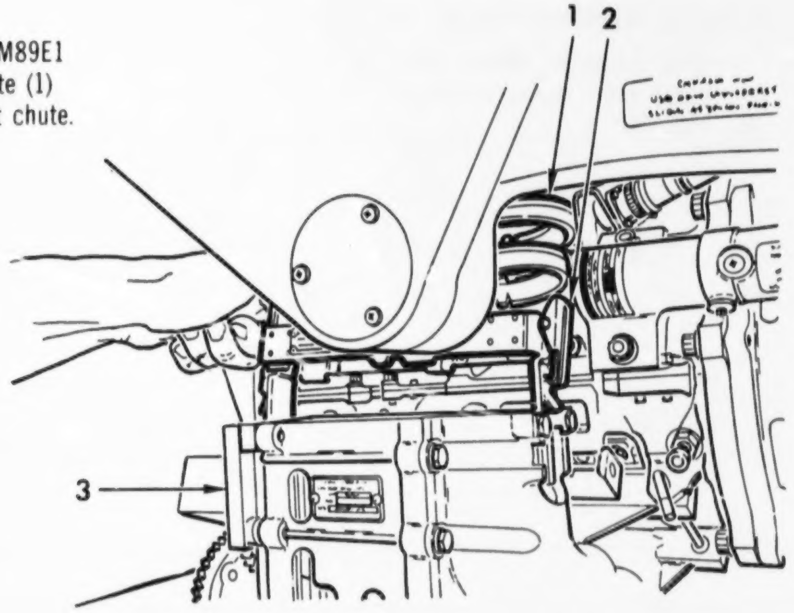
ARR82-27627

3-41. REMOVAL/INSTALLATION OF M89E1 FEEDER (cont)

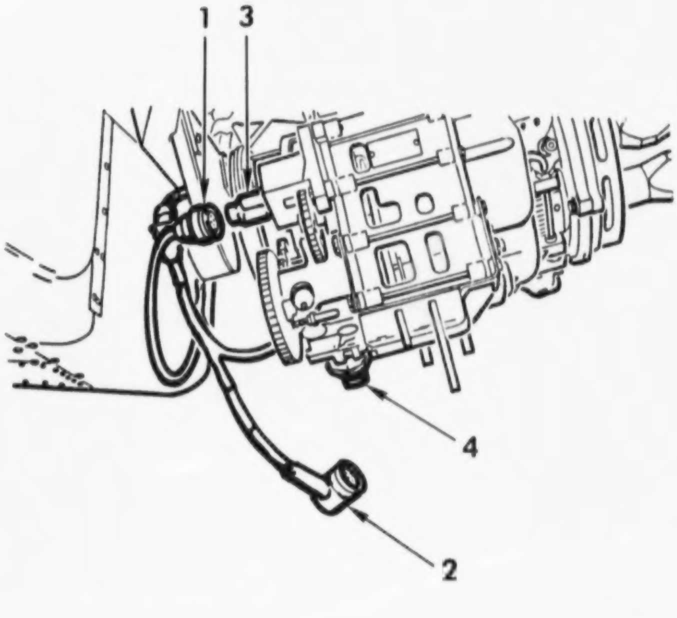
INSTALLATION (cont)

9. CONNECT FEED CHUTE (1).

   Position chuting clips (2) on M89E1 feeder (3) and push feed chute (1) into M89E1 feeder to connect chute.



10. CONNECT CONNECTORS W5P3 (1) AND W2P2 (2).
    a. Connect connector W5P3 (1) to rounds sensing switch (3).
    b. Connect connector W2P2 (2) to feeder solenoid (4).
11. RELEASE ELEVATION DRIVE MOTOR BRAKE AND MANUALLY RAISE BARREL CLUSTER TO STOW POSITION. APPLY ELEVATION DRIVE MOTOR BRAKE.



END OF TASK

3-42. REPAIR OF M89E1 FEEDER

DESCRIPTION

This task covers: Disassembly, cleaning, inspection, and assembly.

INITIAL SETUP

Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental

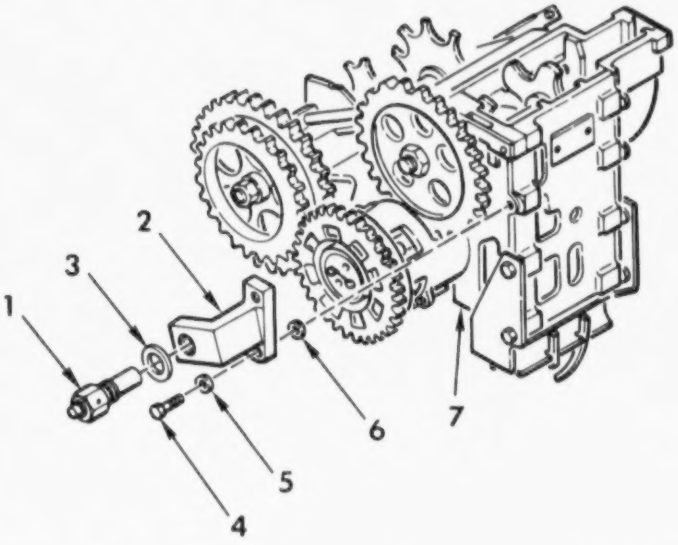
Materials:
  Grease, (Item 3, Appx D)
  Lockwire (Item 5, Appx D)
  Lubricant (Item 6, Appx D)
  Oil (Item 10, Appx D)

Personnel Required:
  68M Aircraft Weapon Systems
    Repairer

Equipment Conditions:
  M89E1 feeder removed, see
    REMOVAL/INSTALLATION OF
    M89E1 FEEDER, para 3-41.

DISASSEMBLY

1. REMOVE ROUNDS SENSING SWITCH (1).
   a. Remove lockwire from rounds sensing switch (1) and bracket (2).
   b. Remove rounds sensing switch (1) and shim (3) from bracket (2).
   c. Remove two bolts (4), two washers (5), a spacer (6), and bracket (2) from aft housing (7).



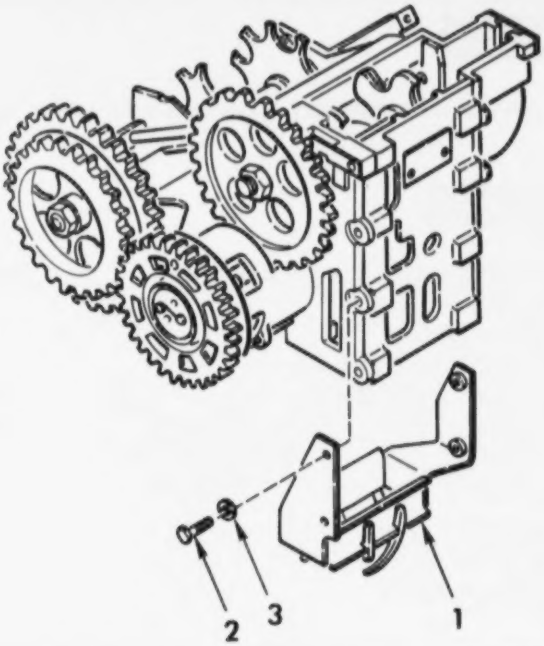
ARR82-27450

3-42. REPAIR OF M89E1 FEEDER (cont)

DISASSEMBLY (cont)

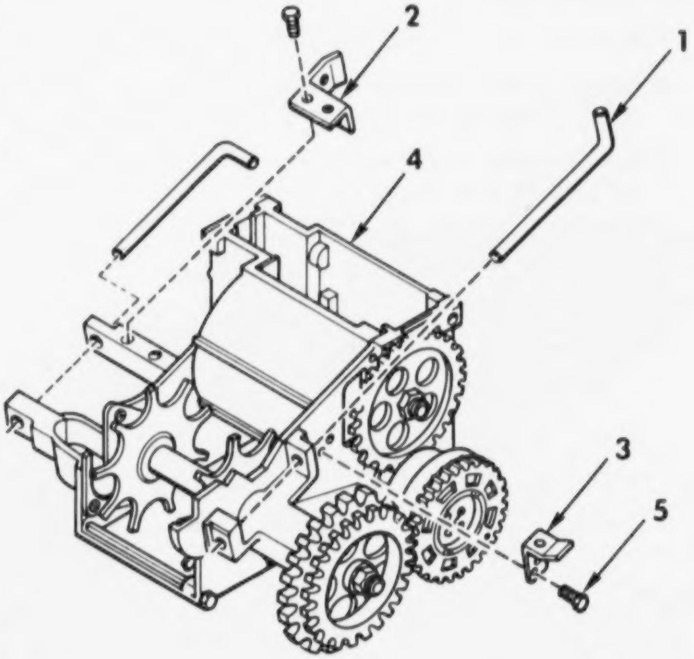
2. REMOVE LINK EJECT CHUTE (1).

   Remove four bolts (2), four washers (3), and link eject chute (1).



ARR82-27451

3. REMOVE MOUNTING PINS (1).
   a. Disengage and remove two mounting pins (1) from pin locks (2 and 3) on M89E1 feeder (4).
   b. Remove lockwire, remove four screws (5), and two pin locks (2 and 3).



ARR82-27452

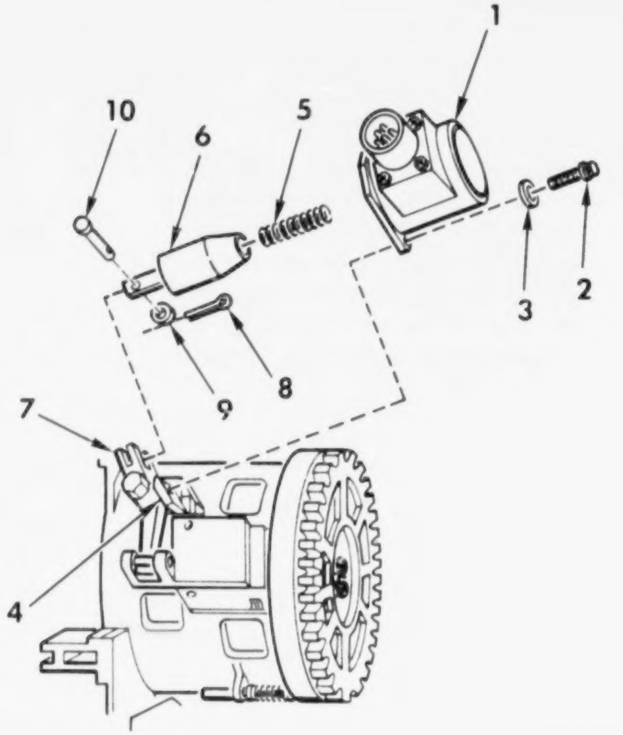
DISASSEMBLY (cont)

4. REMOVE SOLENOID (1).

   a. Remove lockwire, two bolts (2), two washers (3), and solenoid (1) from aft housing (4).

   b. Remove spring (5) and solenoid plunger (6) from drive wedge arm (7).

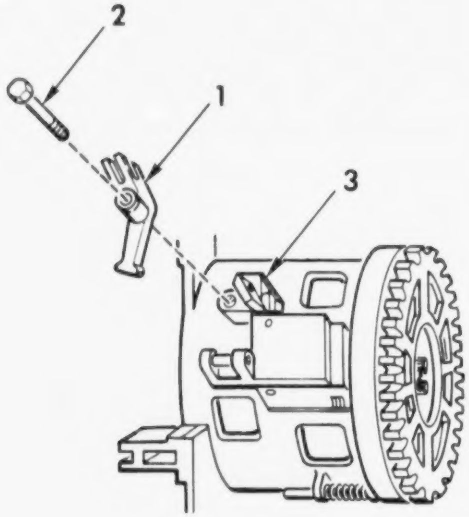
   c. Remove cotter pin (8), washer (9), and pin (10) from solenoid plunger (6).



ARR82-27453

5. REMOVE WEDGE DRIVE ARM (1).

   Remove bolt (2) and wedge drive arm (1) from aft housing (3).



ARR82-27454

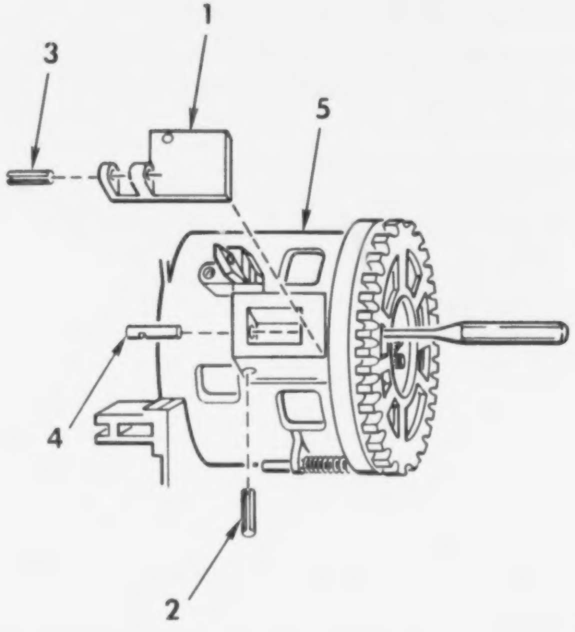
3-42. REPAIR OF M89E1 FEEDER (cont)

DISASSEMBLY (cont)

CAUTION

When removing spring pins, use a pin punch with a diameter greater than the inside diameter of the spring pin. Failure to use a punch of the correct diameter may peen the end of the spring pin causing it to become wedged in the hole.

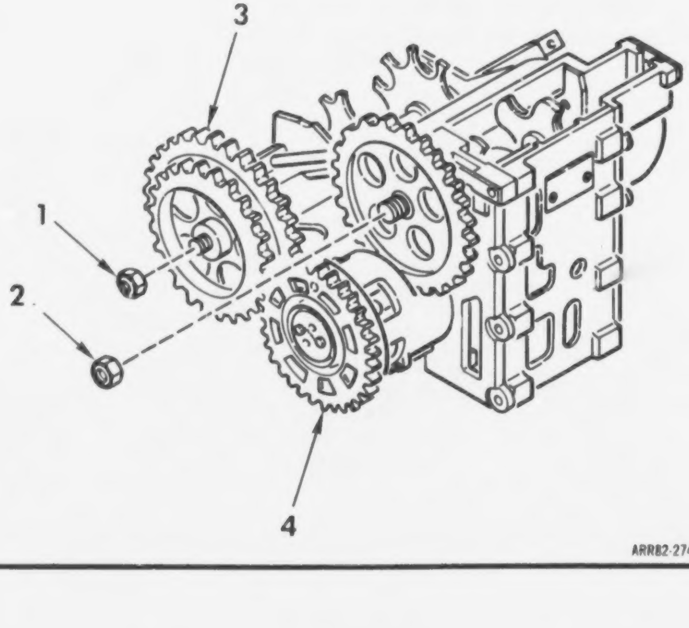
6. REMOVE WEDGE DRIVE (1).
    a. Using a 1/8-inch pin punch, drive out spring pins (2 and 3).
    b. Using a 7/32-inch pin punch, drive out guide pin (4).
    c. Remove wedge drive (1) from aft housing (5).



ARR82-27455

---

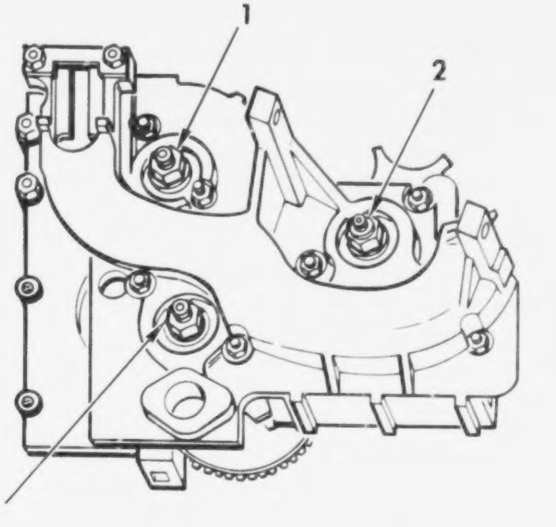
7. REMOVE LOCKNUTS (1 AND 2).
    a. Place a soft piece of material between cluster gear (3) and accelerator gear (4) to restrain gears from turning.
    b. Remove locknuts (1 and 2).



ARR82-27456

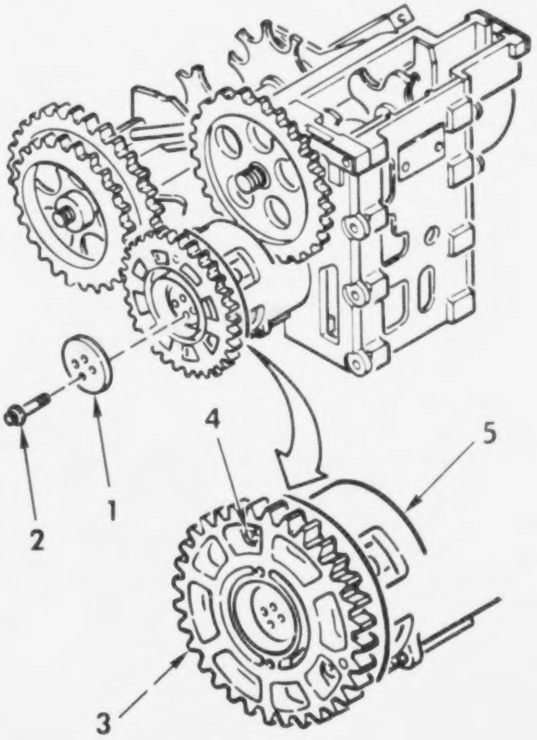
DISASSEMBLY (cont)

8. LOOSEN LOCKNUTS (1, 2, AND 3).



ARR82-27457

9. REMOVE RETAINING CAP (1).
   a. Remove lockwire, two bolts (2), and retaining cap (1) from accelerator gear (3).
   b. Remove soft material from between gear teeth.
   c. Loosen five screws (4), a few turns at a time, until all five screws are free from aft housing (5).

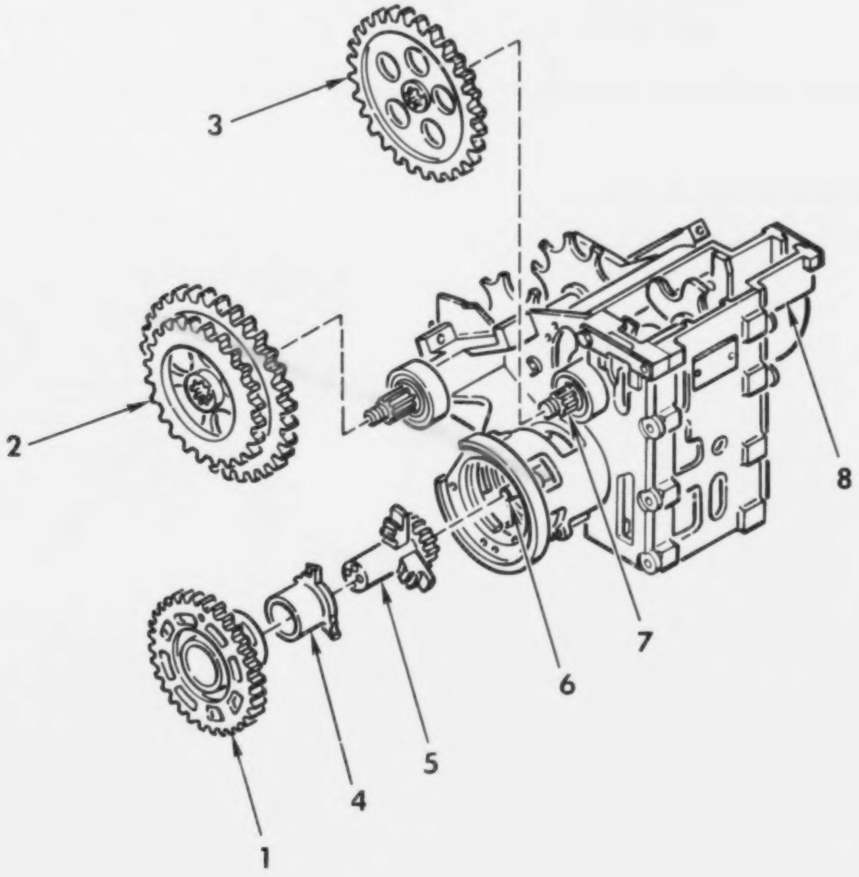


ARR82-27458

3-42. REPAIR OF M89E1 FEEDER (cont)

DISASSEMBLY (cont)

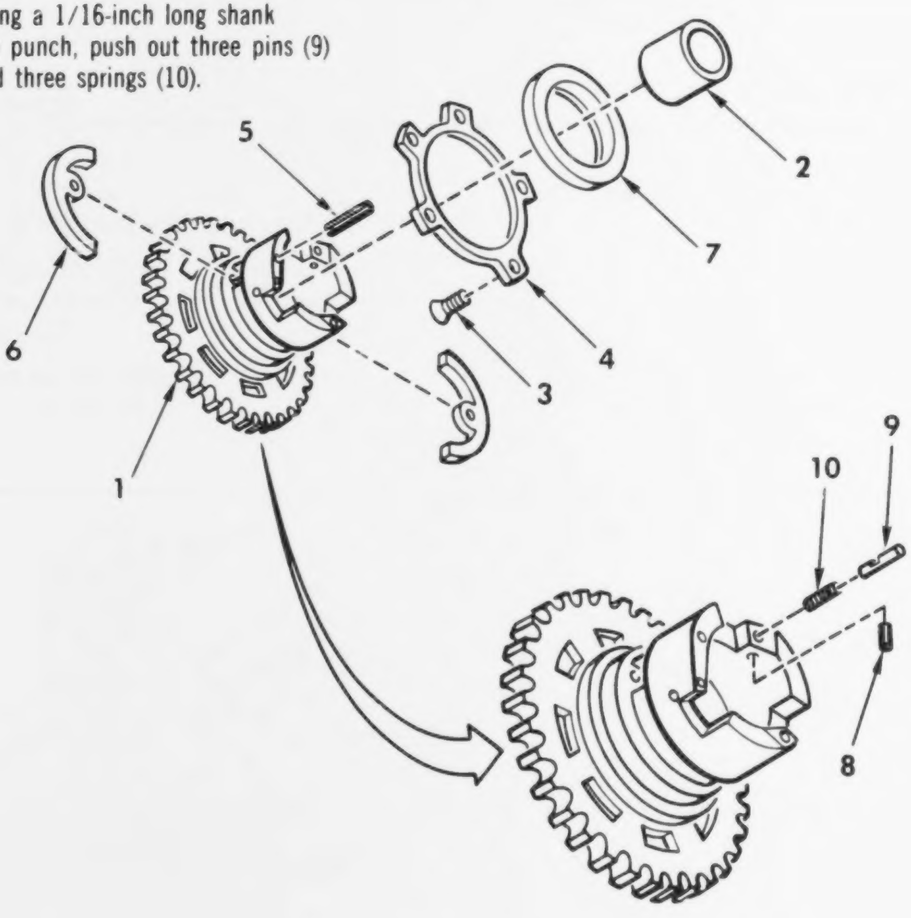
10. REMOVE GEARS (1, 2, AND 3).
    a. Remove and separate gear (1) and rotating vane (4). Pull and remove clutch lock (5) from shaft of accelerator sprocket (6).
    b. Remove gear (2).
    c. Using a soft-face hammer, drive stripper sprocket (7) toward forward housing (8) then remove gear (3).



ARR82-27459

DISASSEMBLY (cont)

11. DISASSEMBLE ACCELERATOR GEAR (1).
    a. Remove bearing (2).
    b. Remove five screws (3) from retainer (4).
    c. Using a 1/8-inch pin punch, drive out two pins (5) securing two retainers (6) to accelerator gear (1). Remove retainers (6), bearing (7), and retainer (4) from accelerator gear.
    d. Using a 1/16-inch pin punch, drive out three spring pins (8).
    e. Using a 1/16-inch long shank pin punch, push out three pins (9) and three springs (10).

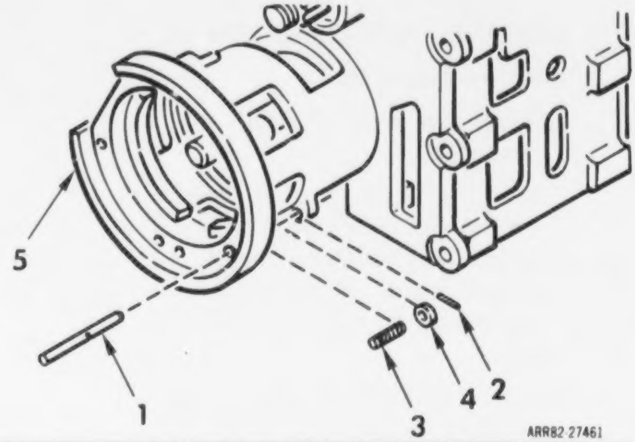


ARR82-27460

3-42. REPAIR OF M89E1 FEEDER (cont)

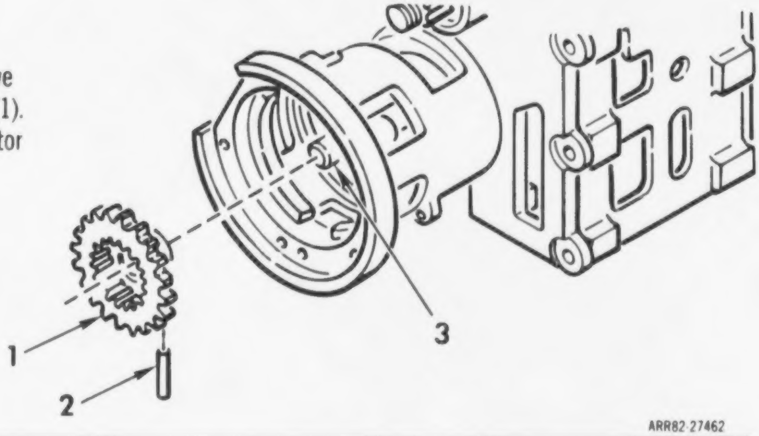
DISASSEMBLY (cont)

12. REMOVE TIMING PIN (1).
    - a. Using a 1/16-inch pin punch, drive spring pin (2) from timing pin (1).
    - b. Remove timing pin (1), spring (3), and washer (4) from aft housing (5).



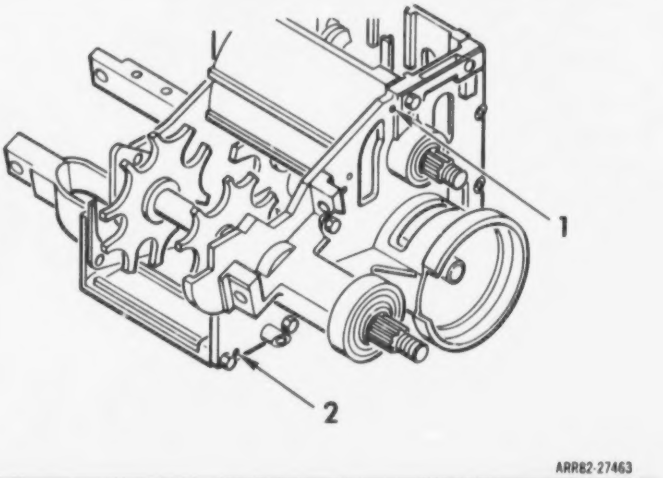
13. REMOVE CLUTCH GEAR (1).

Using a 3/16-inch pin punch, drive spring pin (2) out of clutch gear (1). Remove clutch gear from accelerator sprocket shaft (3).



14. REMOVE SPRING PINS (1 AND 2).

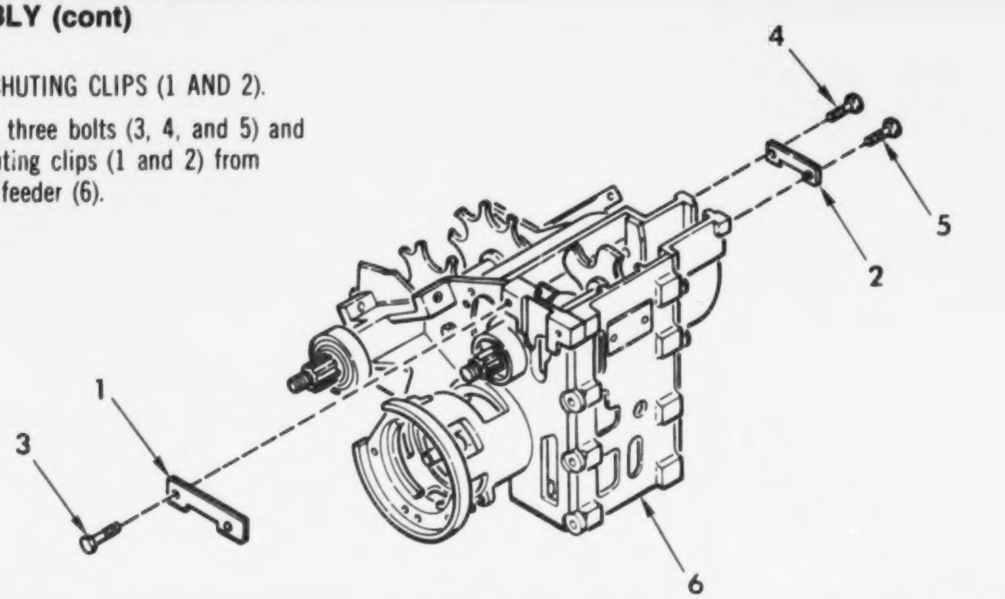
Using a 7/32-inch pin punch, drive spring pins (1 and 2) inward until they are free from the holes.



DISASSEMBLY (cont)

15. REMOVE CHUTING CLIPS (1 AND 2).

Remove three bolts (3, 4, and 5) and two chuting clips (1 and 2) from M89E1 feeder (6).

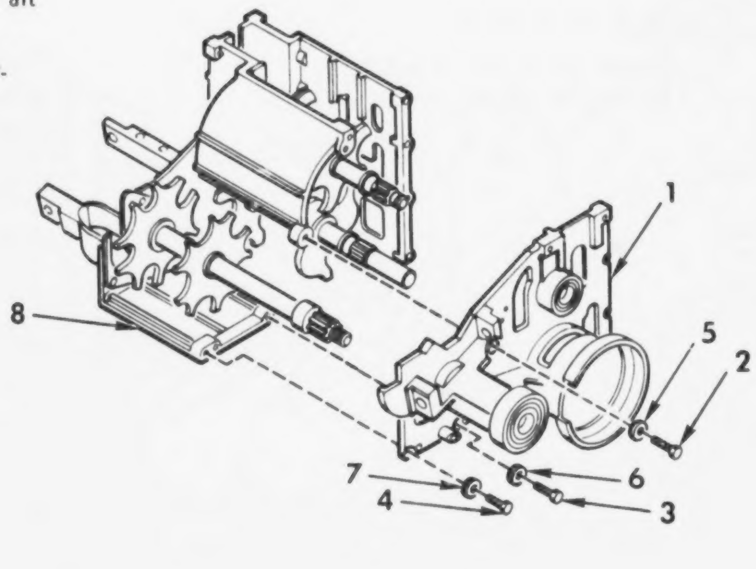


ARR82-27464

16. REMOVE AFT HOUSING (1).

a. Remove three bolts (2, 3, and 4) and three washers (5, 6, and 7) from aft housing (1).

b. Separate aft housing (1) from forward housing (8).

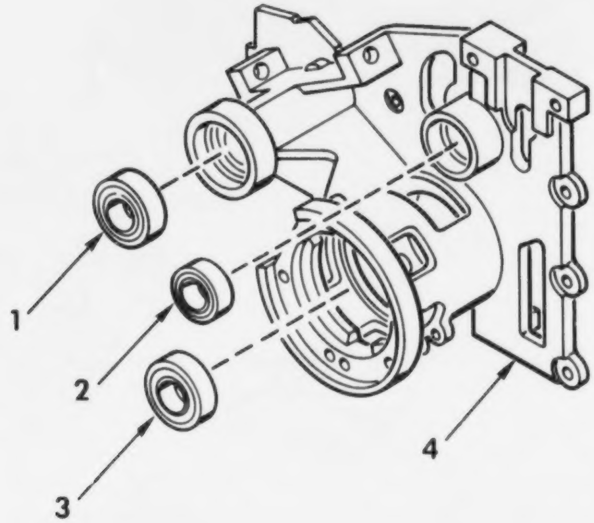


ARR82-27465

3-42. REPAIR OF M89E1 FEEDER (cont)

DISASSEMBLY (cont)

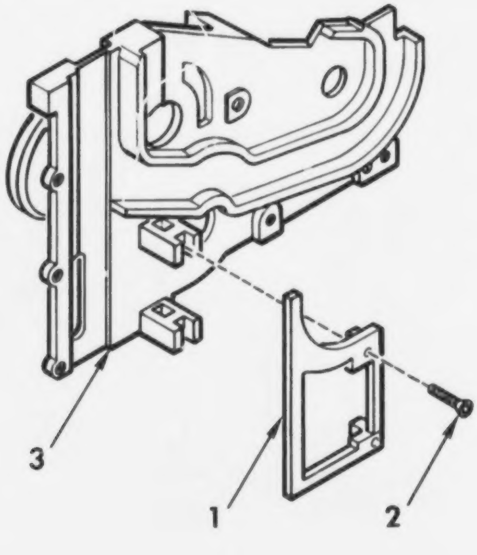
17. REMOVE BEARINGS (1, 2, AND 3) FROM AFT HOUSING (4).



ARR82-27466

18. REMOVE STRIPPER (1).

    Remove two screws (2) and stripper (1) from aft housing (3).

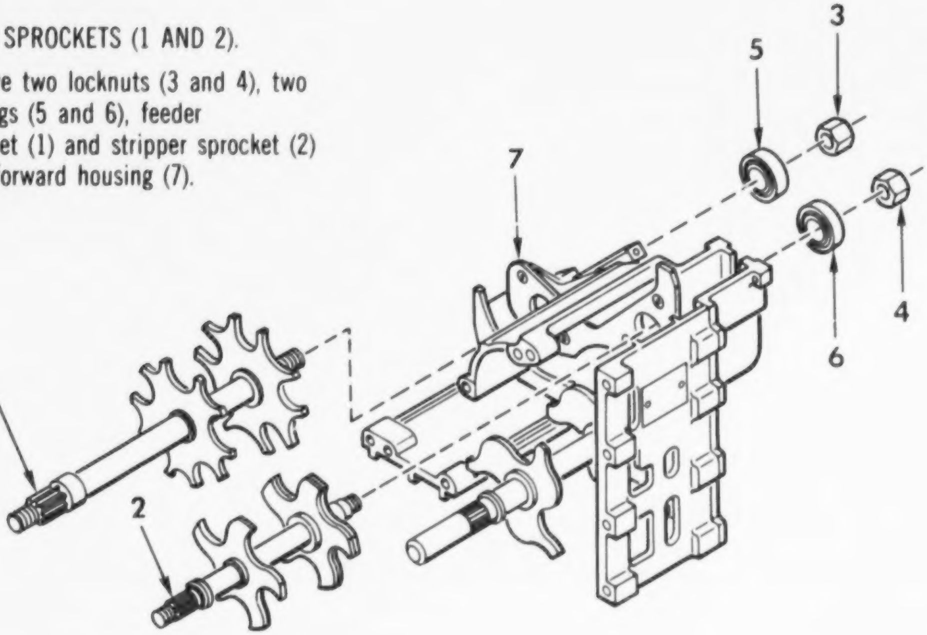


ARR82-27467

DISASSEMBLY (cont)

19. REMOVE SPROCKETS (1 AND 2).

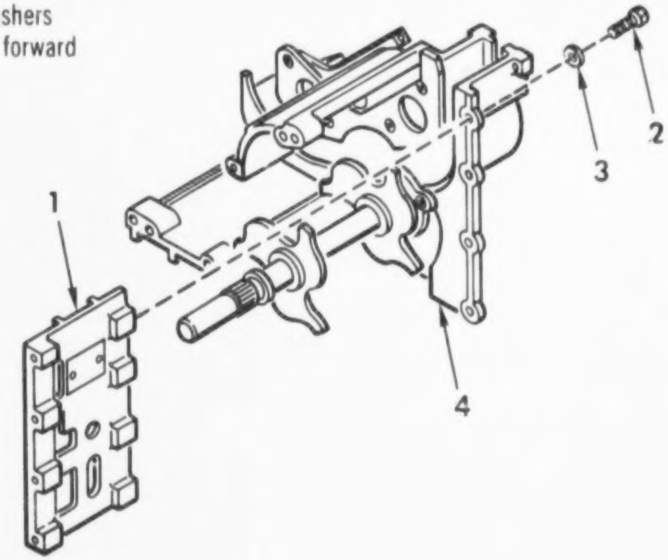
Remove two locknuts (3 and 4), two bearings (5 and 6), feeder sprocket (1) and stripper sprocket (2) from forward housing (7).



ARR82-27468

20. REMOVE T-BAR GUIDE (1).

Remove two bolts (2), two washers (3), and T-bar guide (1) from forward housing (4).



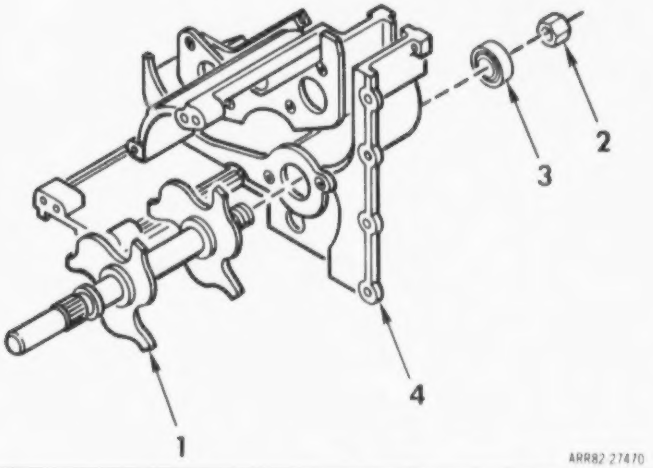
ARR82-27469

3-42. REPAIR OF M89E1 FEEDER (cont)

DISASSEMBLY (cont)

21. REMOVE ACCELERATOR SPROCKET (1).

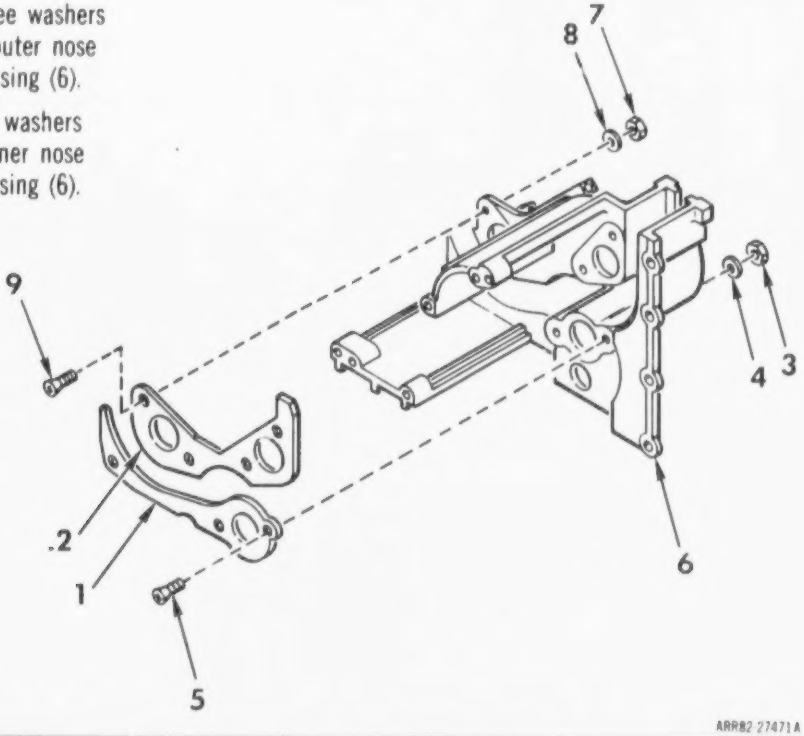
Remove locknut (2), bearing (3), and accelerator sprocket (1) from forward housing (4).



22. REMOVE NOSE GUIDES (1 AND 2).

a. Remove three nuts (3), three washers (4), three screws (5), and outer nose guide (1) from forward housing (6).

b. Remove four nuts (7), four washers (8), four screws (9), and inner nose guide (2) from forward housing (6).



CLEANING

23. PERFORM GENERAL CLEANING PROCEDURES IN ACCORDANCE WITH SECTION IV.

INSPECTION

24. PERFORM GENERAL INSPECTION PROCEDURES IN ACCORDANCE WITH SECTION IV.

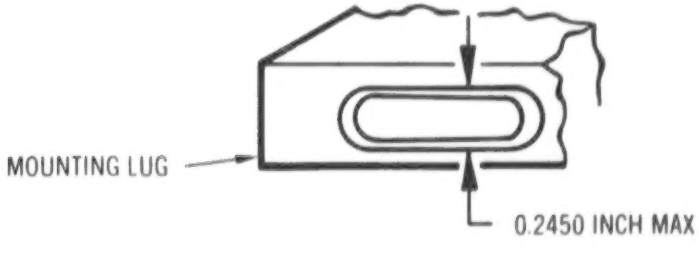
25. INSPECT PARTS IN ACCORDANCE WITH TABULATED DATA.

Component	Possible Defect	Remedy
Link Eject Chute	Bent or cracked	Replace link eject chute.
Rounds Sensing Switch	Dented sensing face, bent connector pins, and damaged or defective threads	Replace rounds sensing switch.
Switch Mounting Bracket	Cracked	Replace switch mounting bracket.
Inner Nose Guide	Broken or bent	Replace inner nose guide.
Outer Nose Guide	Broken or bent	Replace outer nose guide.
Bearings	Hard to turn, broken, or missing components	Replace defective bearings.
Forward Feeder Housing	Cracked or broken	Replace forward feeder housing.
Aft Feeder Housing	Cracked or broken	Replace aft feeder housing.
Wedge	Broken or cracked	Replace wedge.
Wedge Drive Arm	Broken or cracked	Replace wedge drive arm.
Stripper Sprocket	Bent, cracked or broken	Replace defective stripper sprocket.
Spur Gears	Broken, cracked, or missing teeth	Replace spur gears.
Cluster Gear	Broken, cracked, or missing teeth	Replace cluster gear.

3-42. REPAIR OF M89E1 FEEDER (cont)

INSPECTION (cont)

Component	Possible Defect	Remedy
Accelerator Sprocket Drive Spur Gear	Burred holes for anti-backlash pins	Remove burrs.
Feeder Sprocket	Bent, cracked or broken	Replace defective feeder sprocket.
Stripper	Cracked, bent, or broken	Straighten if possible. Replace defective stripper.
Retaining Cap	Cracked or broken	Replace retaining cap.
Retainer	Broken or cracked	Replace retainer.
Vane	Worn or broken	Replace vane.
Lock Assembly	Worn bearing; broken or chipped insert	Replace lock assembly.
Accelerator Sprocket	Bent, cracked or broken	Replace defective accelerator sprocket.
Mounting Pin Inserts	Elongated holes. Maximum acceptable wear as shown below	Replace forward housing.



Component	Possible Defect	Remedy
T-Bar Guide Assembly	Cracked or excessively worn rail (edge worn through)	Replace.

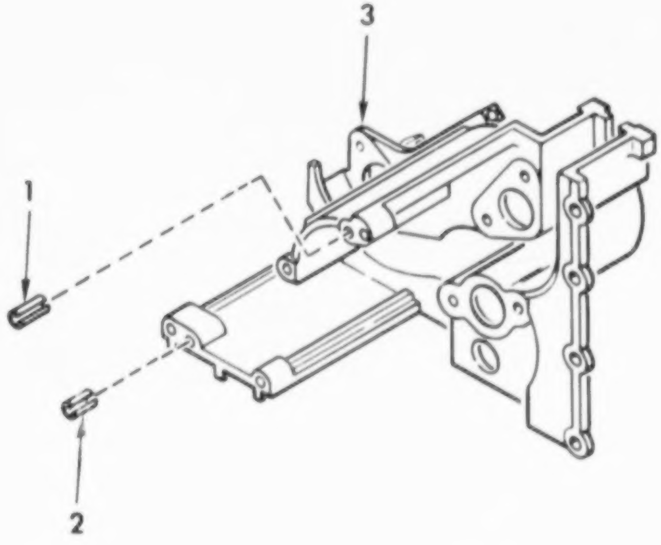
ASSEMBLY

CAUTION

When installing spring pins, use a pin punch with a diameter greater than the inside diameter of the spring pin. Failure to use a punch of the correct size may peen the end of the spring pin causing it to become wedged in the hole.

26. INSTALL SPRING PINS (1 AND 2).

Install spring pins (1 and 2) into forward housing (3). Allow spring pins to protrude 3/8-inch from mating surface of forward housing.

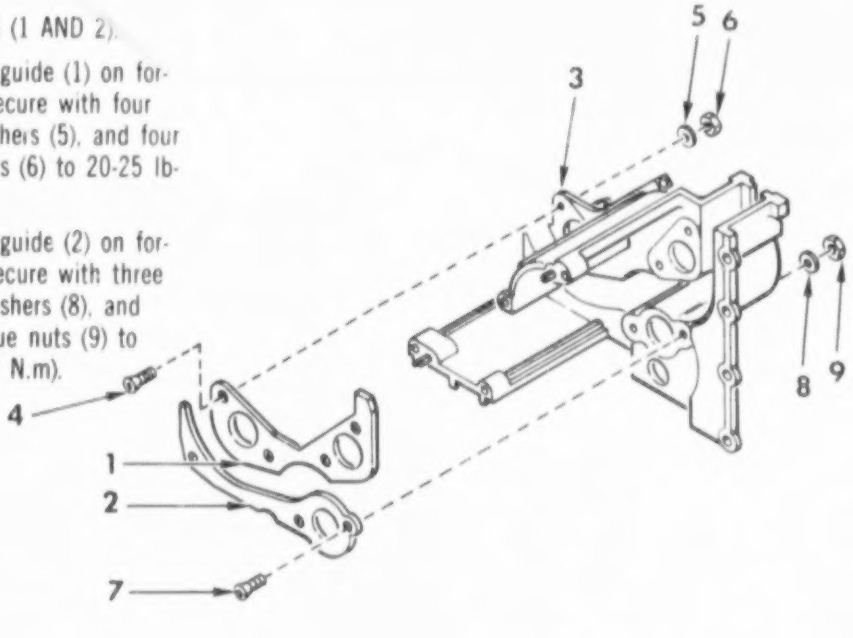


ARR82 27472

27. INSTALL NOSE GUIDES (1 AND 2).

a. Position inner nose guide (1) on forward housing (3). Secure with four screws (4), four washers (5), and four nuts (6). Torque nuts (6) to 20-25 lb-in. (2.3-2.8 N.m).

b. Position outer nose guide (2) on forward housing (3). Secure with three screws (7), three washers (8), and three nuts (9). Torque nuts (9) to 20-25 lb-in. (2.3-2.8 N.m).

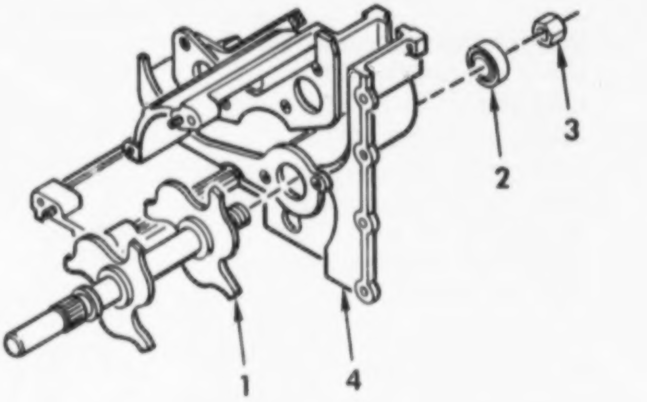


ARR82 27473 A

3-42. REPAIR OF M89E1 FEEDER (cont)

ASSEMBLY (cont)

28. INSTALL ACCELERATOR SPROCKET (1).
    a. Apply a light coating of grease to bearing (2) and bearing bore.
    b. Install bearing (2), accelerator sprocket (1), and locknut (3) in forward housing (4). Tighten locknut fingertight.



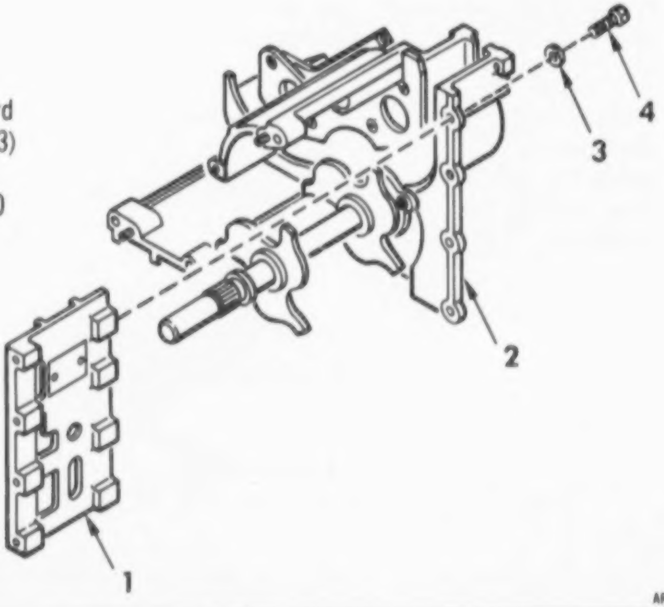
ARR82-27474

NOTE

Temporarily install a bolt in the bottom hole of the forward housing to help aline the T-bar guide. Remove the bolt after the other two bolts are installed.

29. INSTALL T-BAR GUIDE (1).

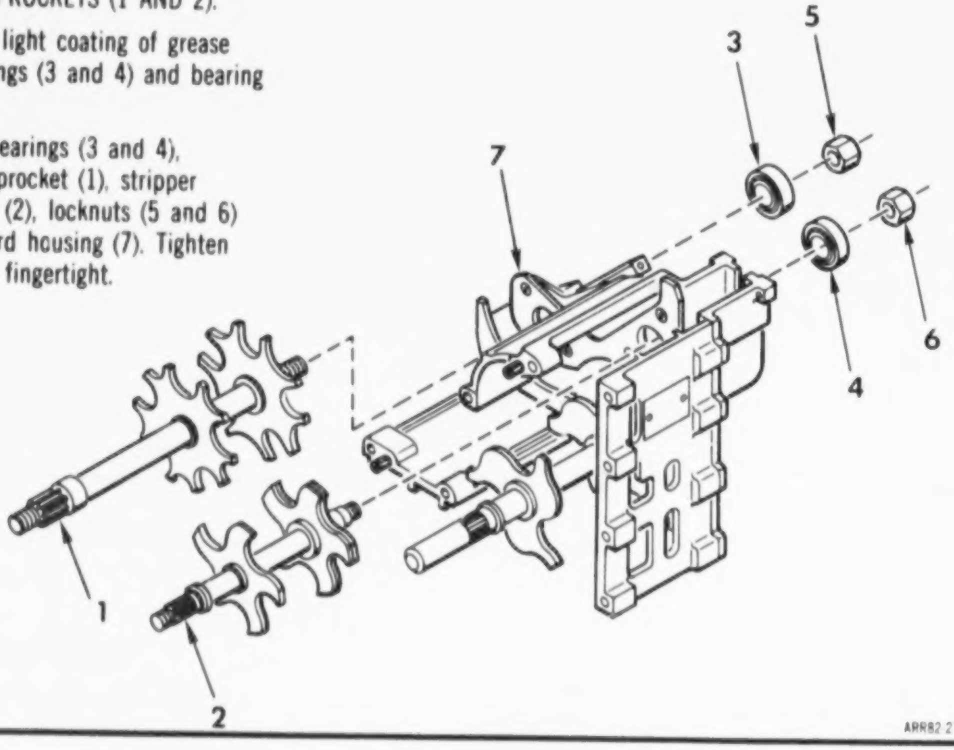
    Position T-bar guide (1) on forward housing (2). Install two washers (3) and two bolts (4) in the top two holes. Torque bolts (4) to 140-150 lb-in. (15.8-16.9 N.m).



ARR82-27475

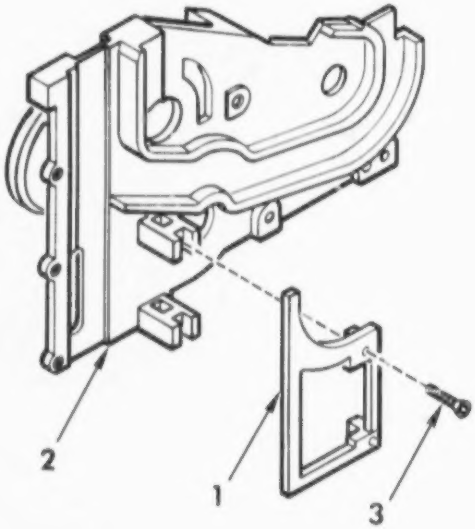
ASSEMBLY (cont)

30. INSTALL SPROCKETS (1 AND 2).
    a. Apply a light coating of grease to bearings (3 and 4) and bearing bores.
    b. Install bearings (3 and 4), feeder sprocket (1), stripper sprocket (2), locknuts (5 and 6) in forward housing (7). Tighten locknuts fingertight.



ARR82-27476

31. INSTALL STRIPPER (1).
    a. Position stripper (1) on aft housing (2) and install two screws (3). Torque screws (3) to 25-35 lb-in. (2.8-3.9 N.m).
    b. Stake each screw at two places.

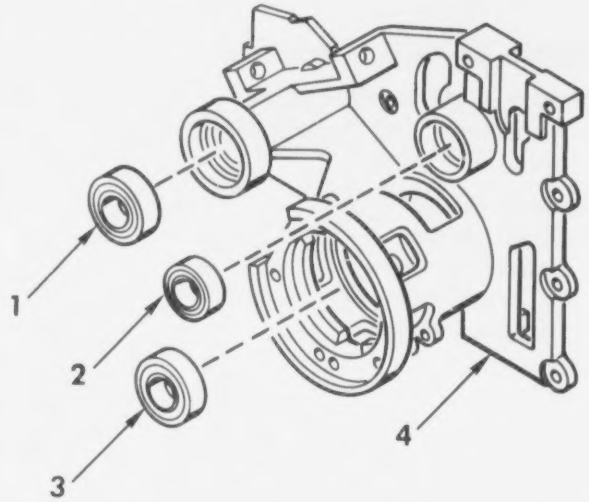


ARR82-27477

3-42. REPAIR OF M89E1 FEEDER (cont)

ASSEMBLY (cont)

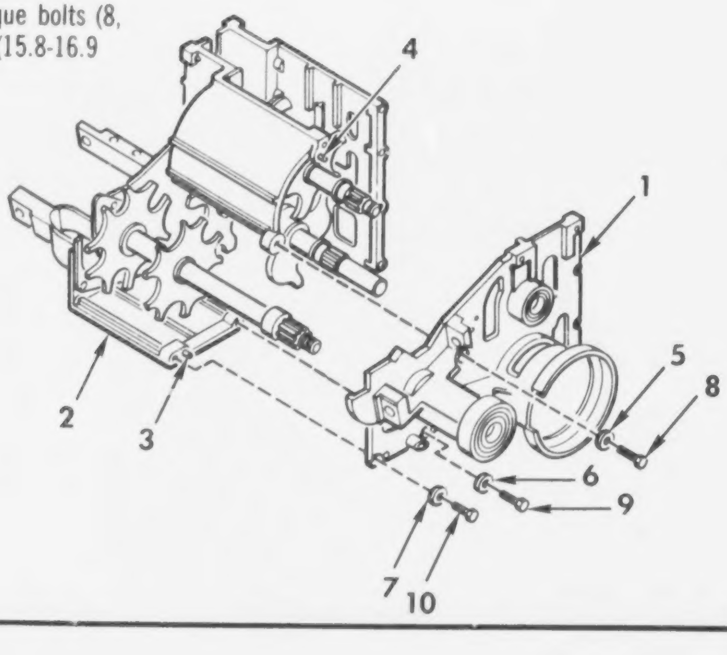
32. INSTALL BEARINGS (1, 2, AND 3) IN AFT HOUSING (4).
    - a. Apply a light coating of grease to each bearing and bearing bore.
    - b. Install bearings (1, 2, and 3) in aft housing (4).



ARR82-27478

33. INSTALL AFT HOUSING (1).

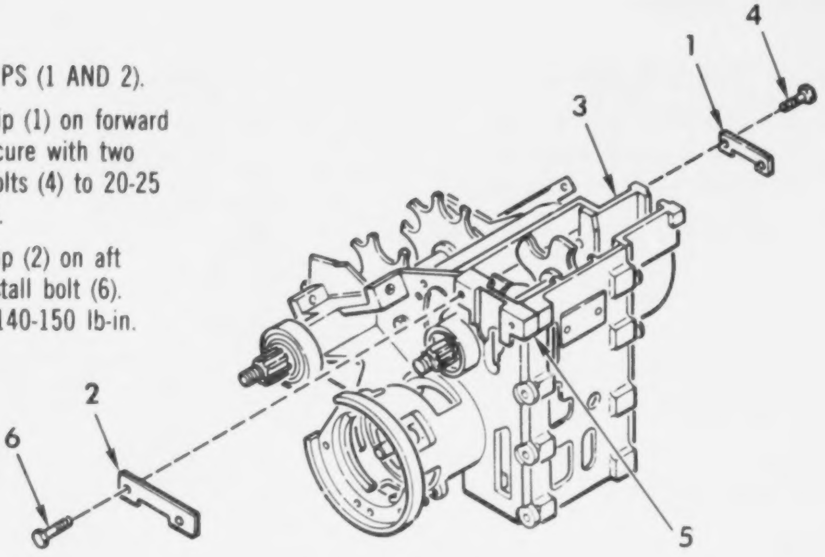
Carefully position each sprocket in aft housing (1) and aline aft housing on pins (3 and 4). Using a soft-face hammer, mate aft housing with forward housing (2). Secure with three washers (5, 6, and 7) and three bolts (8, 9, and 10). Torque bolts (8, 9, 10) to 140-150 lb-in. (15.8-16.9 N.m).



ARR82-27479

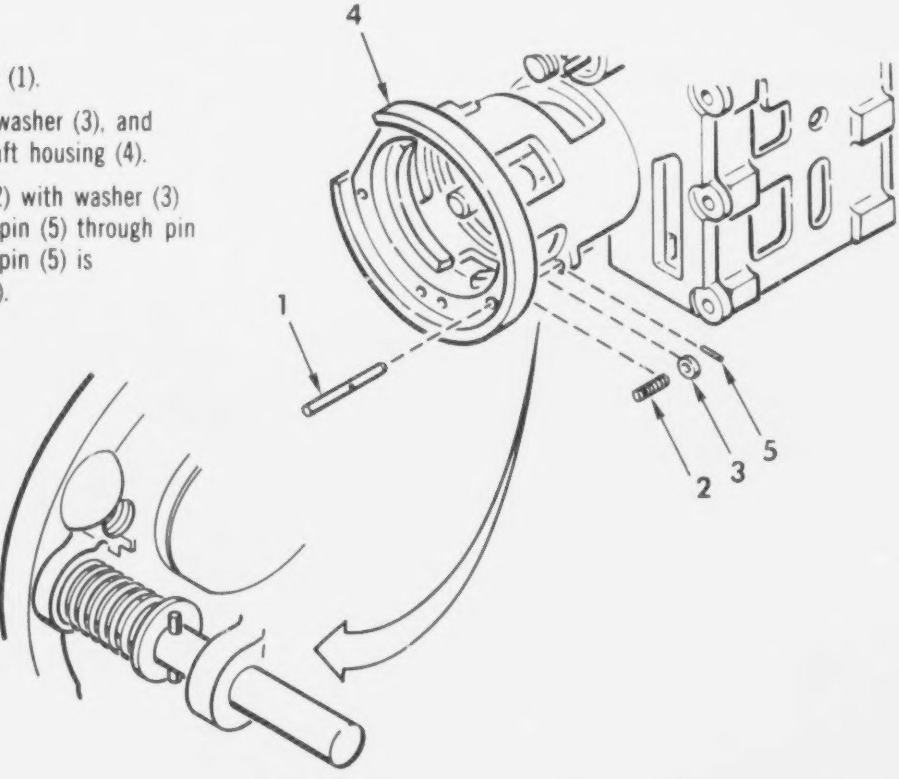
ASSEMBLY (cont)

34. INSTALL CHUTING CLIPS (1 AND 2).
    a. Position chuting clip (1) on forward housing (3) and secure with two bolts (4). Torque bolts (4) to 20-25 lb-in. (2.2-2.8 N.m).
    b. Position chuting clip (2) on aft housing (5) and install bolt (6). Torque bolt (6) to 140-150 lb-in. (15.8-16.9 N.m).



ARR82-27480

35. INSTALL TIMING PIN (1).
    a. Install spring (2), washer (3), and timing pin (1) in aft housing (4).
    b. Compress spring (2) with washer (3) and install spring pin (5) through pin (1) so that spring pin (5) is centered in pin (1).

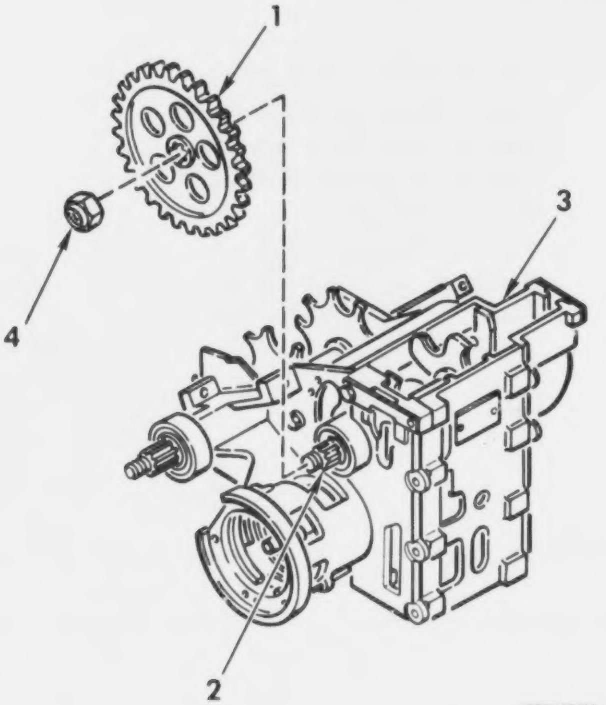


ARR82-27481

3-42. REPAIR OF M89E1 FEEDER (cont)

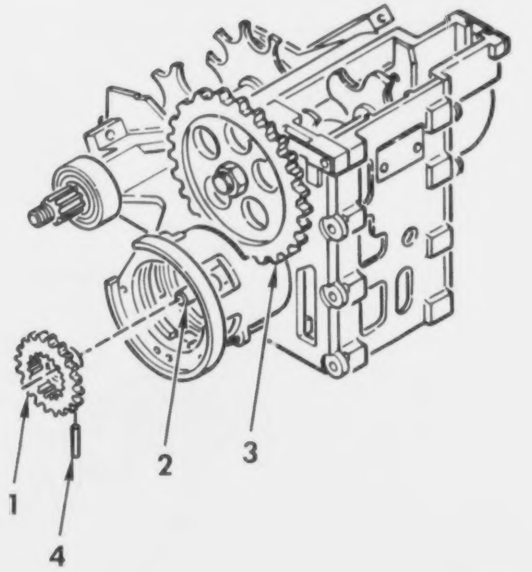
ASSEMBLY (cont)

36. INSTALL STRIPPER GEAR (1).
    a. Position stripper sprocket shaft (2) toward forward housing (3) for clearance to install stripper gear (1).
    b. Install stripper gear (1), timing mark outward, on stripper sprocket shaft (2). Install locknut (4), fingertight.



ARR82 27482

37. INSTALL CLUTCH GEAR (1).
    a. Lubricate internal teeth of clutch gear (1) with grease.
    b. Install clutch gear (1) on accelerator sprocket shaft (2) so that timing mark on clutch gear is alined with timing mark on stripper gear (3). Secure gear to shaft with spring pin (4).

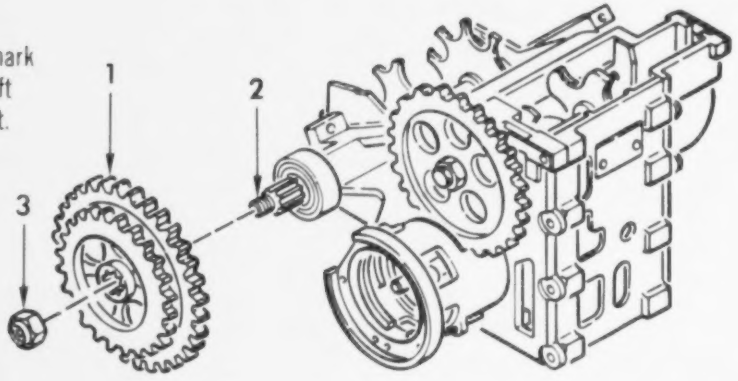


ARR82 27483

ASSEMBLY (cont)

38. INSTALL CLUSTER GEAR (1).

    Install cluster gear (1), timing mark outward, on feeder sprocket shaft (2). Install locknut (3) fingertight.

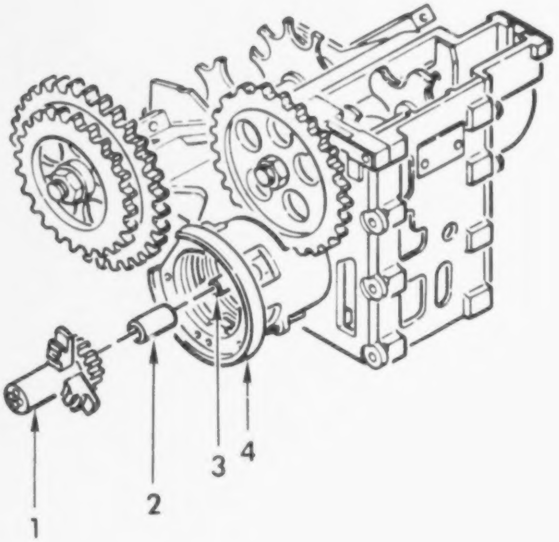


ARR82 27484

CAUTION

If the M89E1 feeder is to be used at temperatures below 0 °F (– 18 °C), oil (item 10, Appx D) shall be used on all internal clutch parts instead of lubricant (item 6, Appx D).

39. INSTALL CLUTCH LOCK (1).
    - a. Lubricate shaft of clutch lock (1) with lubricant. Lubricate gear teeth on clutch lock with grease.
    - b. Install bearing (2) in clutch lock (1).
    - c. Aline missing tooth on clutch lock (1) with timing mark on clutch gear and install clutch lock on accelerator sprocket shaft (3).
    - d. Rotate accelerator sprocket shaft (3) allowing tabs of clutch lock (1) to fully engage slots in aft housing (4).

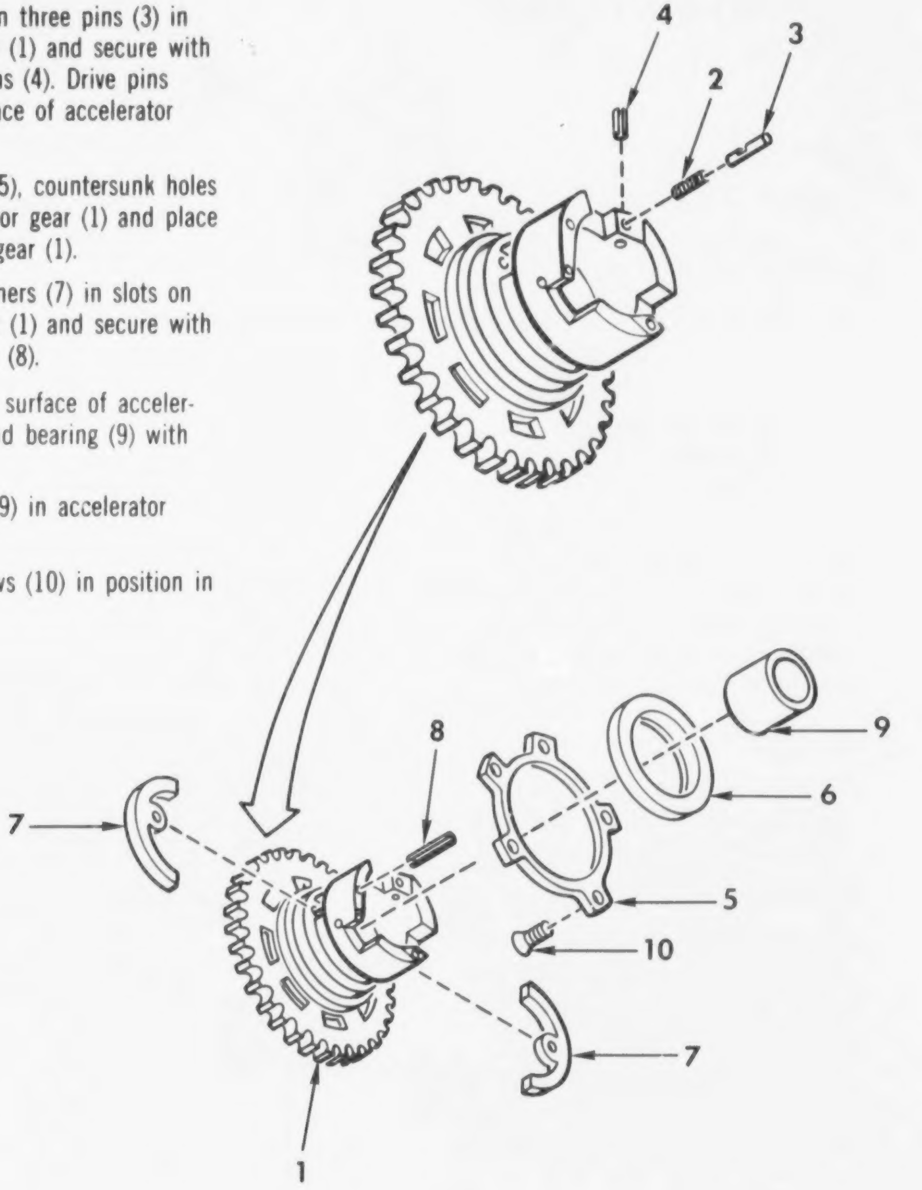


ARR82 27485

3-42. REPAIR OF M89E1 FEEDER (cont)

ASSEMBLY (cont)

40. ASSEMBLE ACCELERATOR GEAR (1).
    a. Install three springs (2) in accelerator gear (1).
    b. Properly position three pins (3) in accelerator gear (1) and secure with three spring pins (4). Drive pins flush with surface of accelerator gear.
    c. Place retainer (5), countersunk holes facing accelerator gear (1) and place bearing (6) on gear (1).
    d. Place two retainers (7) in slots on accelerator gear (1) and secure with two spring pins (8).
    e. Lubricate inner surface of accelerator gear (1) and bearing (9) with lubricant.
    f. Insert bearing (9) in accelerator gear (1).
    g. Place five screws (10) in position in retainer (5).



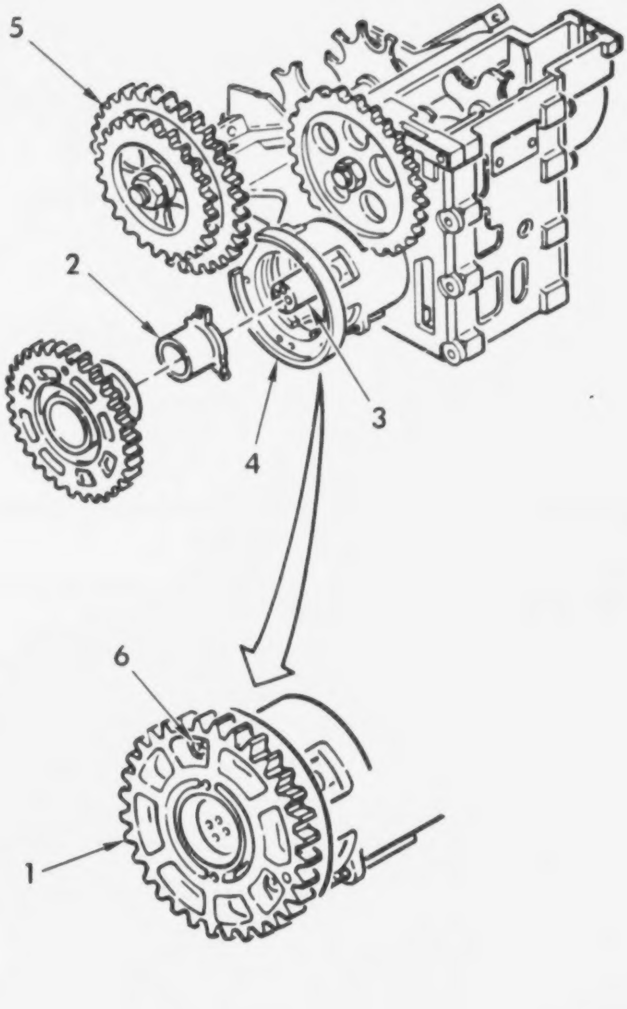
ARR82-27486

ASSEMBLY (cont)

CAUTION

Exercise care when tightening screws to avoid deforming retainer and binding gear.

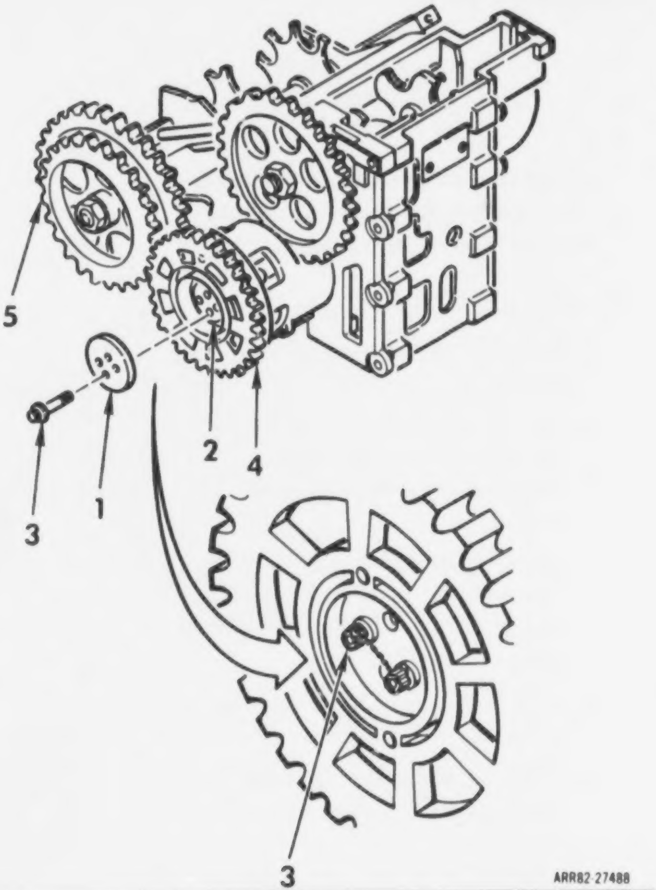
41. INSTALL ACCELERATOR GEAR (1).
    a. Lubricate rotating vane (2) with lubricant.
    b. Install rotating vane (2) on clutch lock (3). Tabs of vane must enter corresponding slots in aft housing (4).
    c. Install accelerator gear (1) on rotating vane (2), alining timing mark on accelerator gear (1) with timing mark on cluster gear (5).
    d. After installation, check timing of gears.
    e. Aline five screws (6) with holes in aft housing (4). Tighten each screw a few turns at a time until all are snug. Check for binding. Torque screws (6) to 35-45 lb-in. (3.9-5.0 N.m).



3-42. REPAIR OF M89E1 FEEDER (cont)

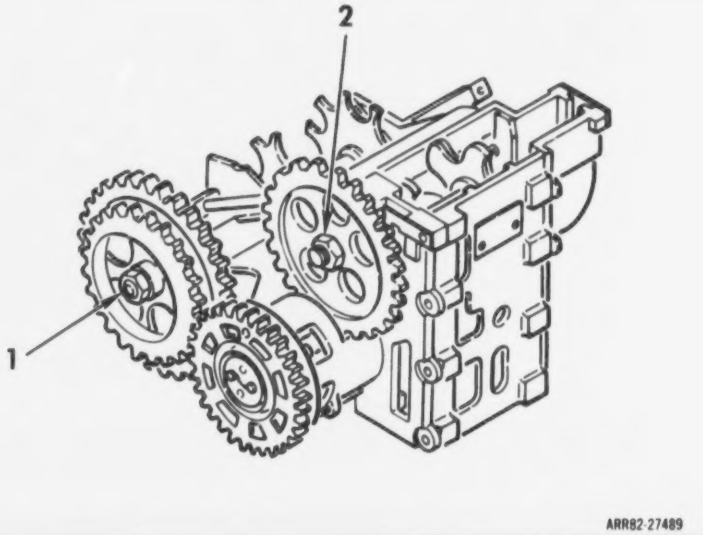
ASSEMBLY (cont)

42. INSTALL RETAINING CAP (1).
    a. Place retaining cap (1) on end of clutch lock (2) and install two bolts (3).
    b. Place a soft piece of material between teeth of accelerator gear (4) and cluster gear (5) to restrain gears from turning.
    c. Torque bolts (3) to 80-90 lb-in. (9.0-10.1 N.m).
    d. Lockwire two retaining cap bolts (3).



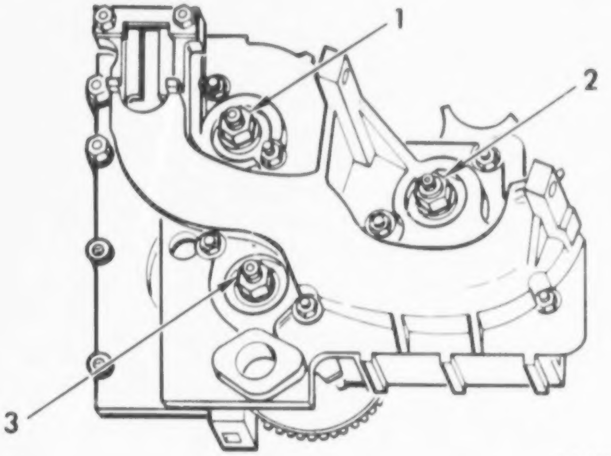
43. TORQUE LOCKNUTS (1 AND 2).

    Torque locknuts (1 and 2) to 13 to 17 lb-ft (18 to 23 N.m).

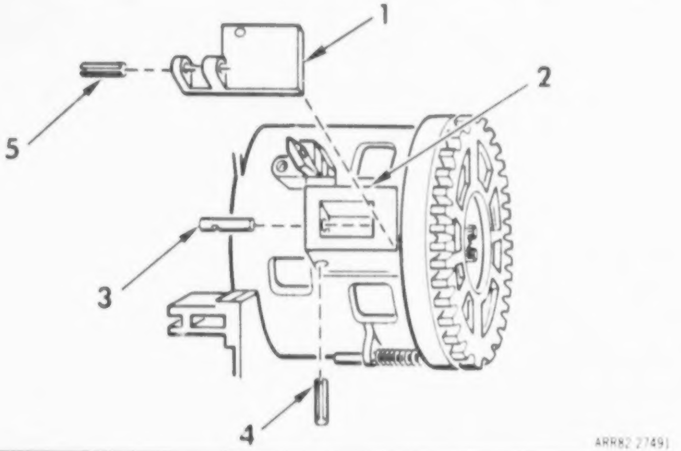


ASSEMBLY (cont)

44. TORQUE LOCKNUTS (1, 2, AND 3).
    a. Torque locknuts (1, 2, and 3) to 13 to 17 lb-ft (18 to 23 N.m).
    b. Remove soft material from between gear teeth.

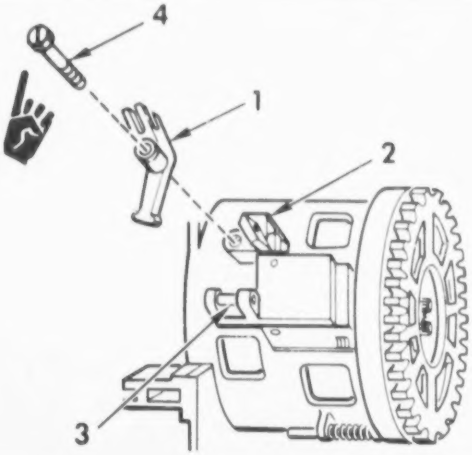


45. INSTALL WEDGE DRIVE (1).
    a. Position wedge drive (1) on aft housing (2).
    b. Properly position guide pin (3), install in aft housing and through wedge drive (1).
    c. Install spring pins (4 and 5).



46. INSTALL WEDGE DRIVE ARM (1).

    Position wedge drive arm (1) on aft housing (2) with end of arm under spring pin (3). Secure with bolt (4). Torque bolt (4) to 20-25 lb-in. (2.2-2.8 N.m).



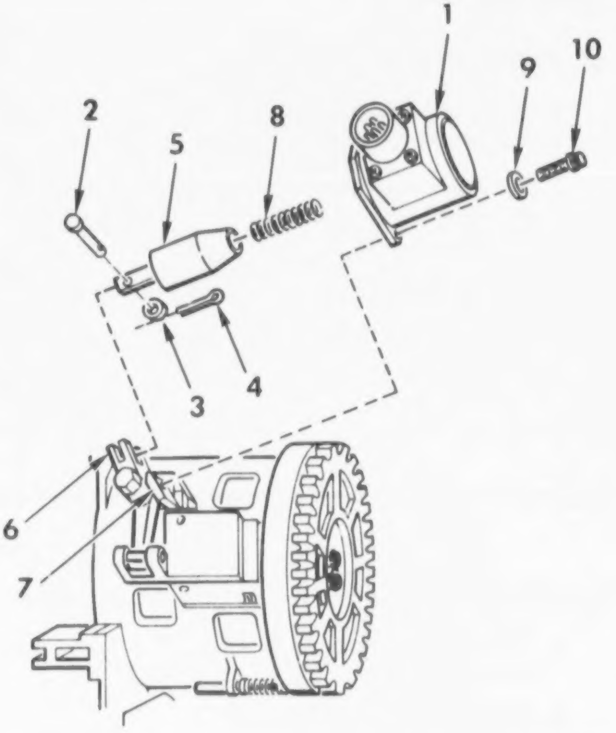
3-42. REPAIR OF M89E1 FEEDER (cont)

ASSEMBLY (cont)

CAUTION

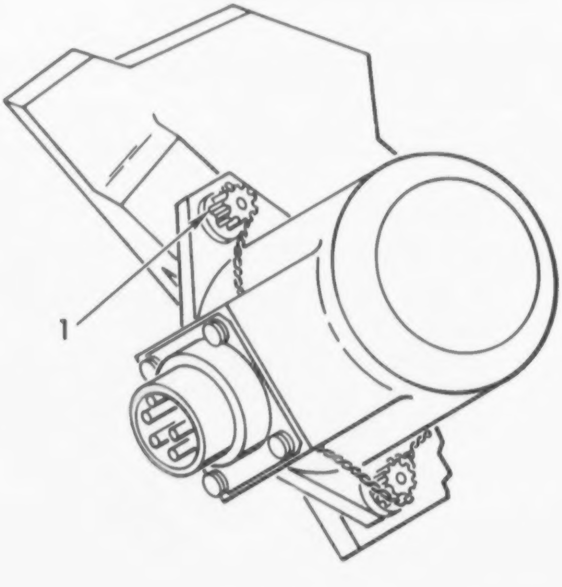
Washer must be positioned on side of arm nearest housing to prevent disengagement of linkage.

47. INSTALL SOLENOID (1).
    - a. Install pin (2), washer (3), and cotter pin (4) on solenoid plunger (5).
    - b. Install solenoid plunger (5) on wedge drive arm (6) with washer (3) on side nearest aft housing (7).
    - c. Install spring (8) in solenoid plunger (5).
    - d. Place solenoid (1) onto solenoid plunger (5) and secure with two washers (9) and two bolts (10). Torque bolts 45-60 lb-in. (5.1-6.7 N.m).



ARR82 27493

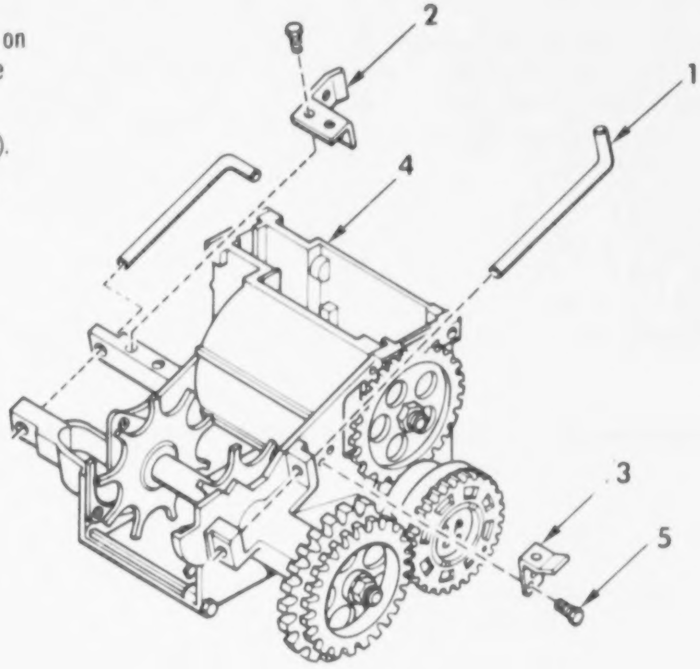
48. LOCKWIRE TWO SOLENOID BOLTS (1).



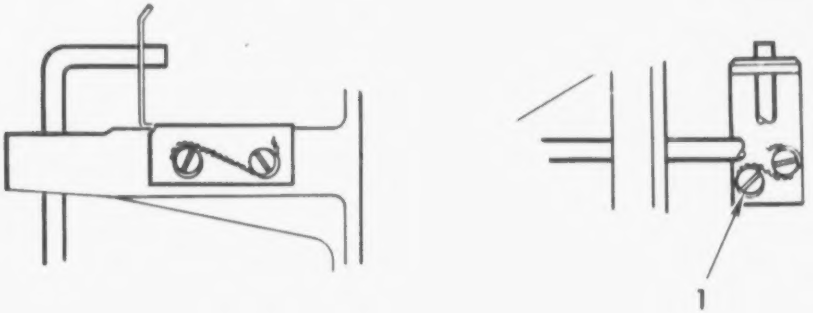
ARR82-27494

ASSEMBLY (cont)

49. INSTALL MOUNTING PINS (1).
    a. Position pin locks (2 and 3) on M89E1 feeder (4) and secure with four screws (5).
    b. Install two mounting pins (1).
    c. Snap mounting pins (1) into pin locks (2 and 3).


2
1
4
3
5
ARR82 27495

50. LOCKWIRE FOUR PIN LOCK SCREWS (1).

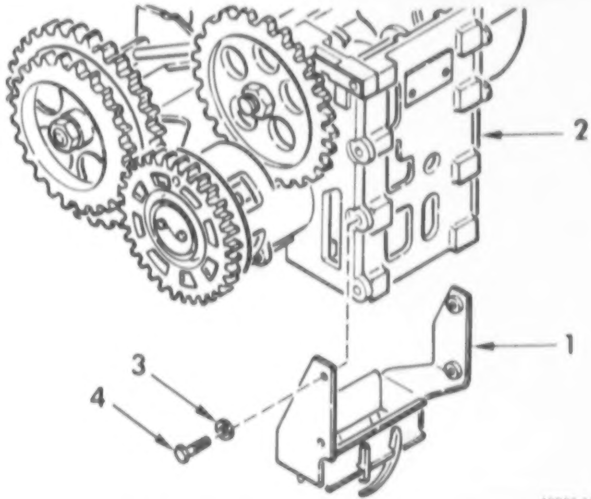

1
ARR82 27496

3-42. REPAIR OF M89E1 FEEDER (cont)

ASSEMBLY (cont)

51. INSTALL LINK EJECT CHUTE (1).

    Position link eject chute (1) on M89E1 feeder (2) and secure with four washers (3) and four bolts (4). Torque bolts (4) to 140-150 lb-in. (15.8-16.9 N.m).

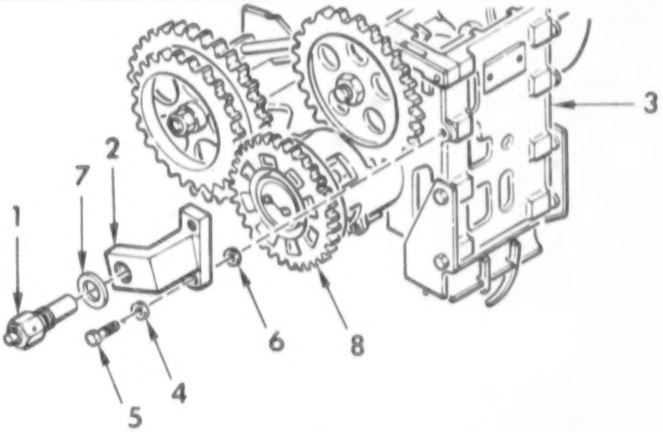


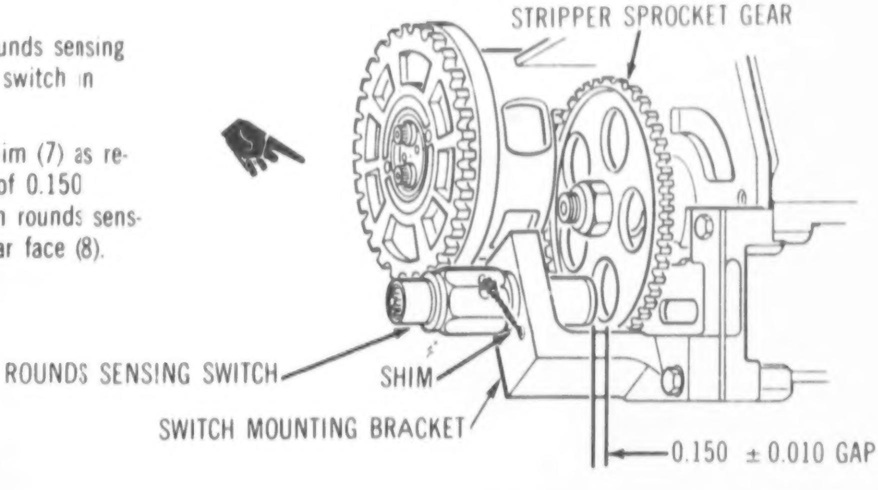
ARR82 27497

NOTE

Laminated shim thickness is 0.048 inch. Each lamina is 0.002 inch.

52. INSTALL ROUNDS SENSING SWITCH (1).
    a. Position bracket (2) on feeder (3). Secure with two washers (4), two bolts (5), and a spacer (6). Torque bolts (5) to 140-150 lb-in. (15.8-16.9 N.m).
    b. Install shim (7) on rounds sensing switch (1) and install switch in bracket (2).
    c. Adjust thickness of shim (7) as required to obtain gap of 0.150 ± 0.010 inch between rounds sensing switch (1) and gear face (8).



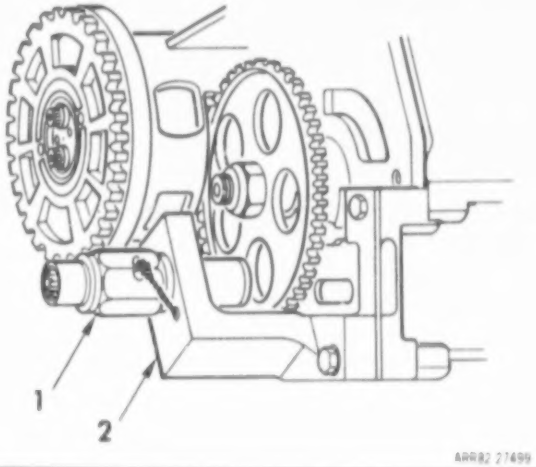

STRIPPER SPROCKET GEAR
ROUNDS SENSING SWITCH
SHIM
SWITCH MOUNTING BRACKET
0.150 ± 0.010 GAP

ARR82 27498

ASSEMBLY (cont)

53. LOCKWIRE ROUNDS SENSING SWITCH (1) TO BRACKET (2).

54. PERFORM CHECKOUT OF M89E1 FEEDER, PARA 3-43.



END OF TASK

3-43. CHECKOUT OF M89E1 FEEDER

DESCRIPTION

This test covers: Checkout.

INITIAL SETUP

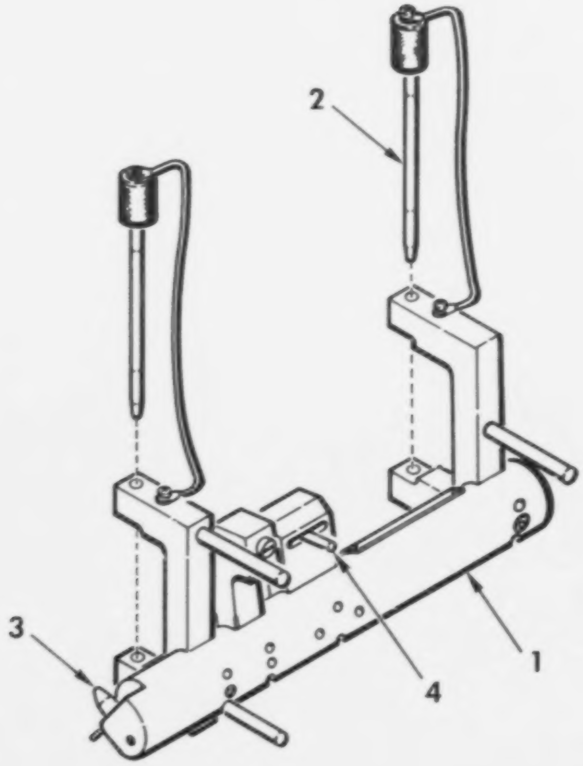
Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental
  Checking Fixture

Personnel Required:
  68M Aircraft Weapon Systems
    Repairer

Equipment Conditions:
  In shop, on bench.

CHECKOUT

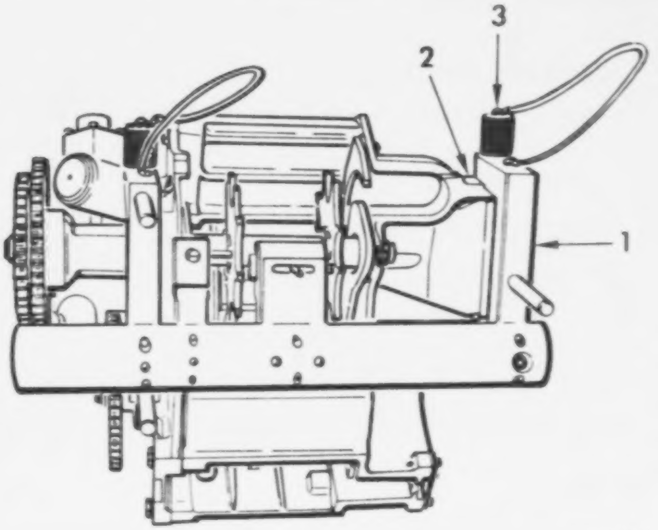
1. PREPARE CHECKING FIXTURE (1).
   a. Remove two mounting pins (2) from checking fixture (1).
   b. Place timing lock pin (3) in retracted position.
   c. Place sprocket gage (4) in center position.



ARR82-27401

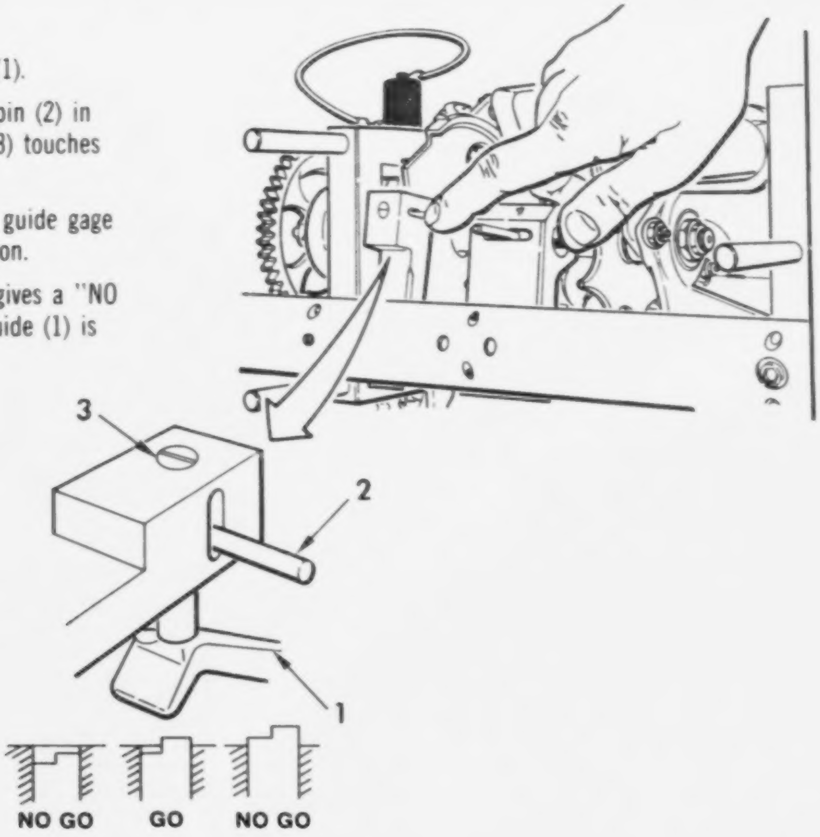
CHECKOUT (cont)

2. INSTALL CHECKING FIXTURE (1).
   a. Position checking fixture (1) on feeder mounting lugs (2).
   b. Insert two mounting pins (3) through checking fixture (1) and into feeder mounting lugs (2).



ARR82 27402

3. CHECK AFT ROUND GUIDE (1).
   a. Press round guide gage pin (2) in until round guide gage (3) touches round guide (1).
   b. Check that top of round guide gage (3) gives a "GO" indication.
   c. If round guide gage (3) gives a "NO GO" indication, round guide (1) is worn or oversized.



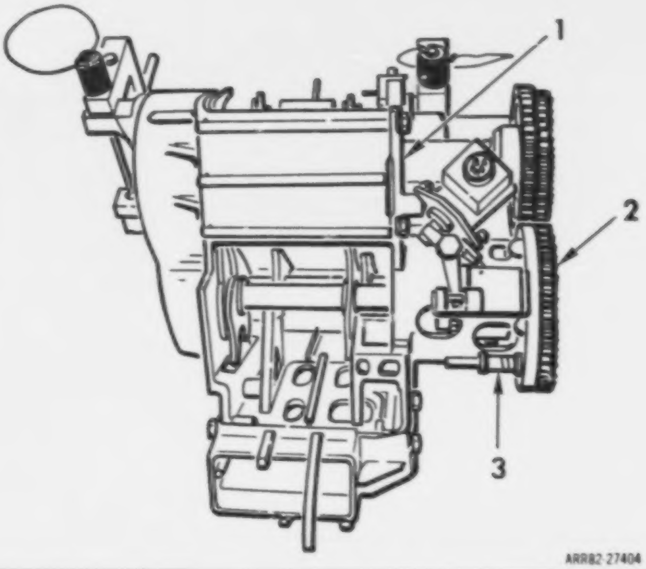
ARR82 27403

best copy available

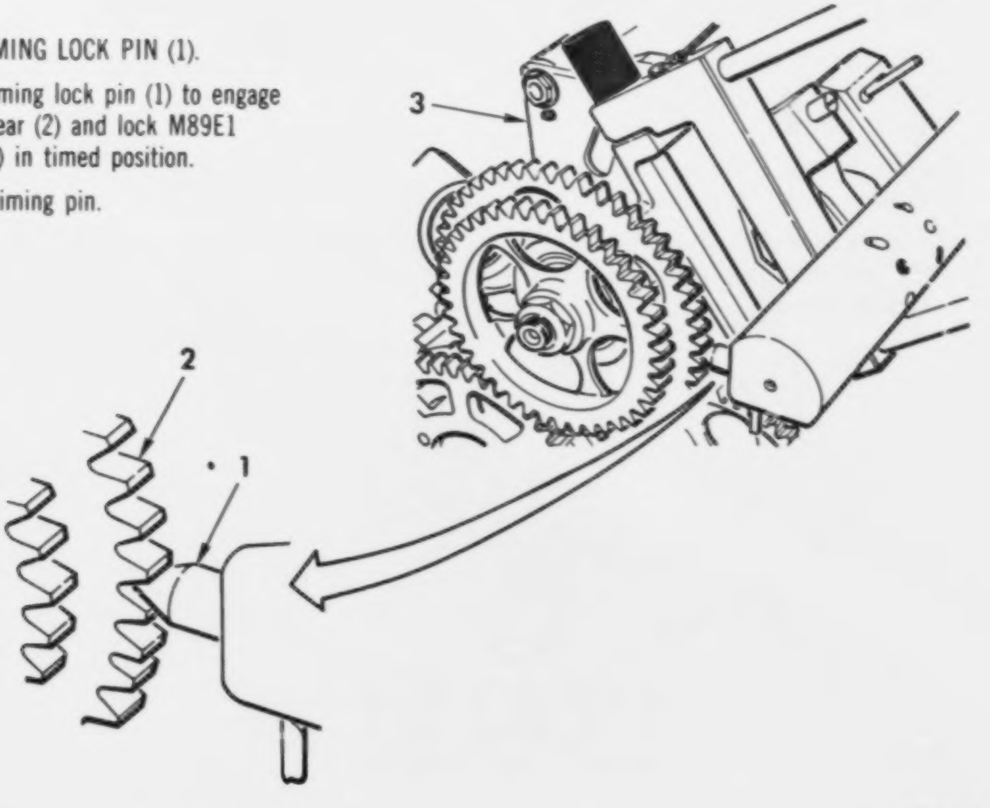
3-43. CHECKOUT OF M89E1 FEEDER (cont)

CHECKOUT (cont)

4. TIME M89E1 FEEDER (1).
   a. Rotate accelerator gear (2) until timing pin (3) can be depressed all the way into timing gear.
   b. Hold timing pin (3) in.

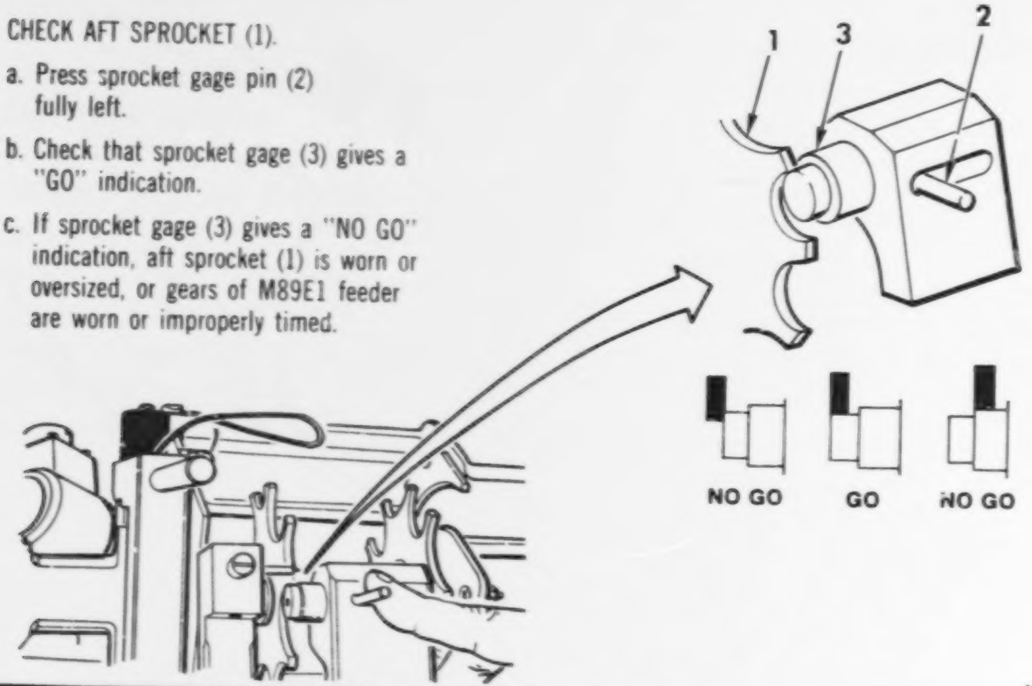


5. ENGAGE TIMING LOCK PIN (1).
   a. Rotate timing lock pin (1) to engage cluster gear (2) and lock M89E1 feeder (3) in timed position.
   b. Release timing pin.



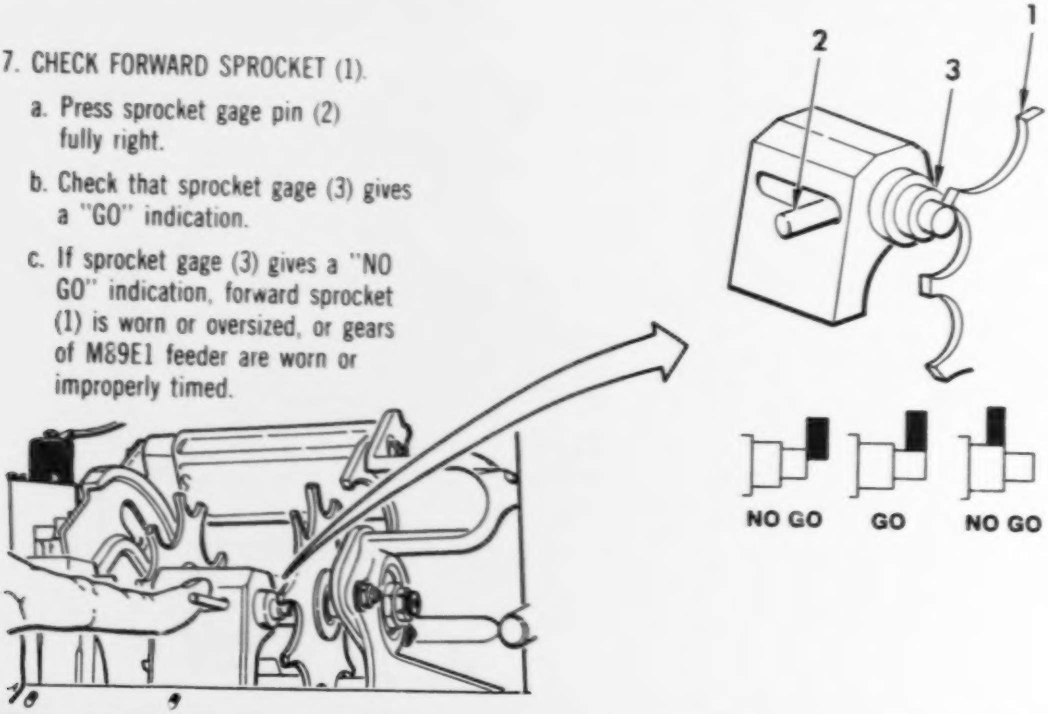
CHECKOUT (cont)

6. CHECK AFT SPROCKET (1).
   a. Press sprocket gage pin (2) fully left.
   b. Check that sprocket gage (3) gives a "GO" indication.
   c. If sprocket gage (3) gives a "NO GO" indication, aft sprocket (1) is worn or oversized, or gears of M89E1 feeder are worn or improperly timed.



ARR82-27406

7. CHECK FORWARD SPROCKET (1).
   a. Press sprocket gage pin (2) fully right.
   b. Check that sprocket gage (3) gives a "GO" indication.
   c. If sprocket gage (3) gives a "NO GO" indication, forward sprocket (1) is worn or oversized, or gears of M89E1 feeder are worn or improperly timed.



ARR82-27407

3-43. CHECKOUT OF M89E1 FEEDER (cont)

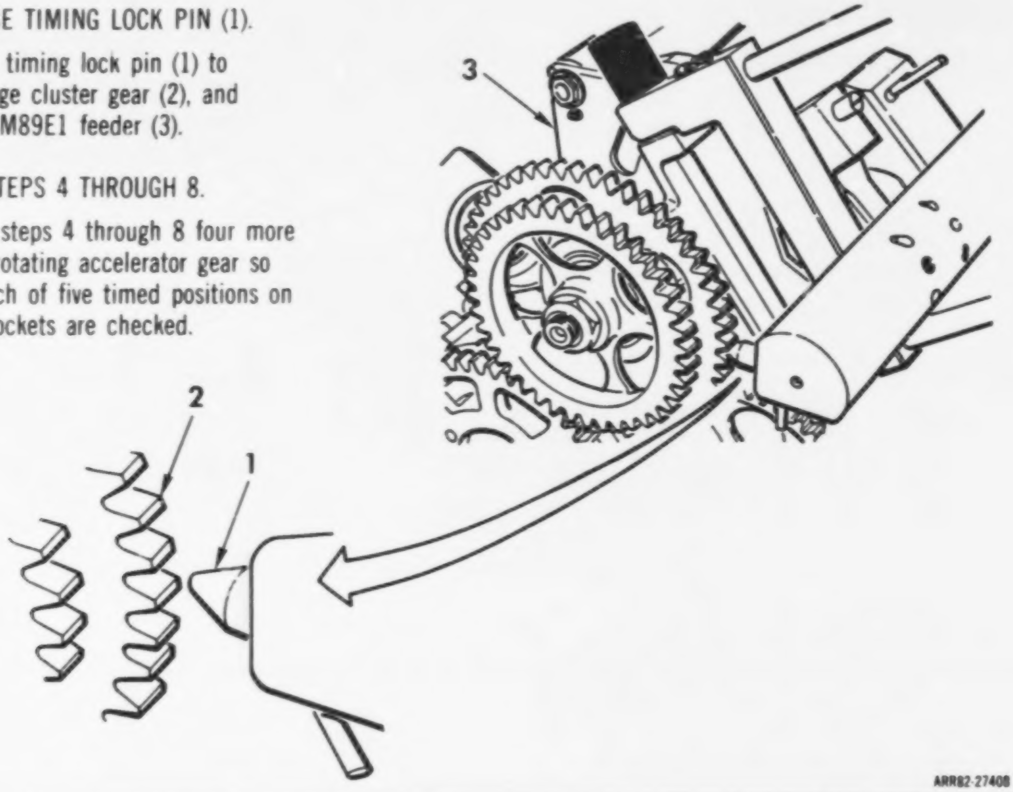
CHECKOUT (cont)

8. DISENGAGE TIMING LOCK PIN (1).

   Retract timing lock pin (1) to disengage cluster gear (2), and unlock M89E1 feeder (3).

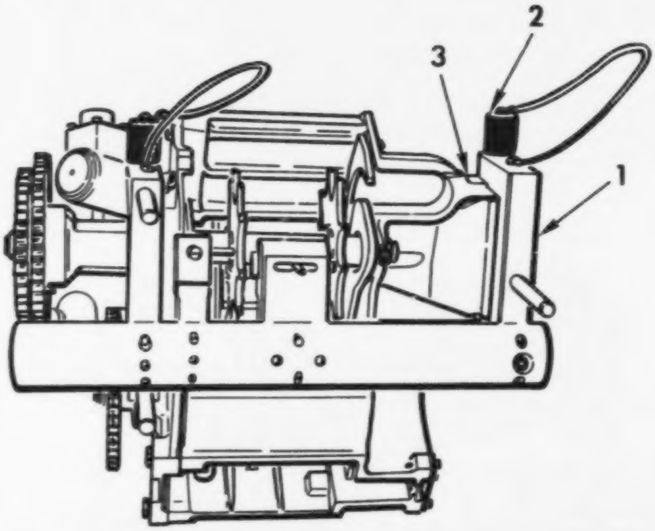
9. REPEAT STEPS 4 THROUGH 8.

   Repeat steps 4 through 8 four more times, rotating accelerator gear so that each of five timed positions on the sprockets are checked.



ARR82-27408

10. REMOVE CHECKING FIXTURE (1).
    a. Remove two mounting pins (2) from checking fixture (1) and feeder mounting lugs (3).
    b. Remove checking fixture (1) from M89E1 feeder.
    c. Reinsert two mounting pins (2) into checking fixture (1).



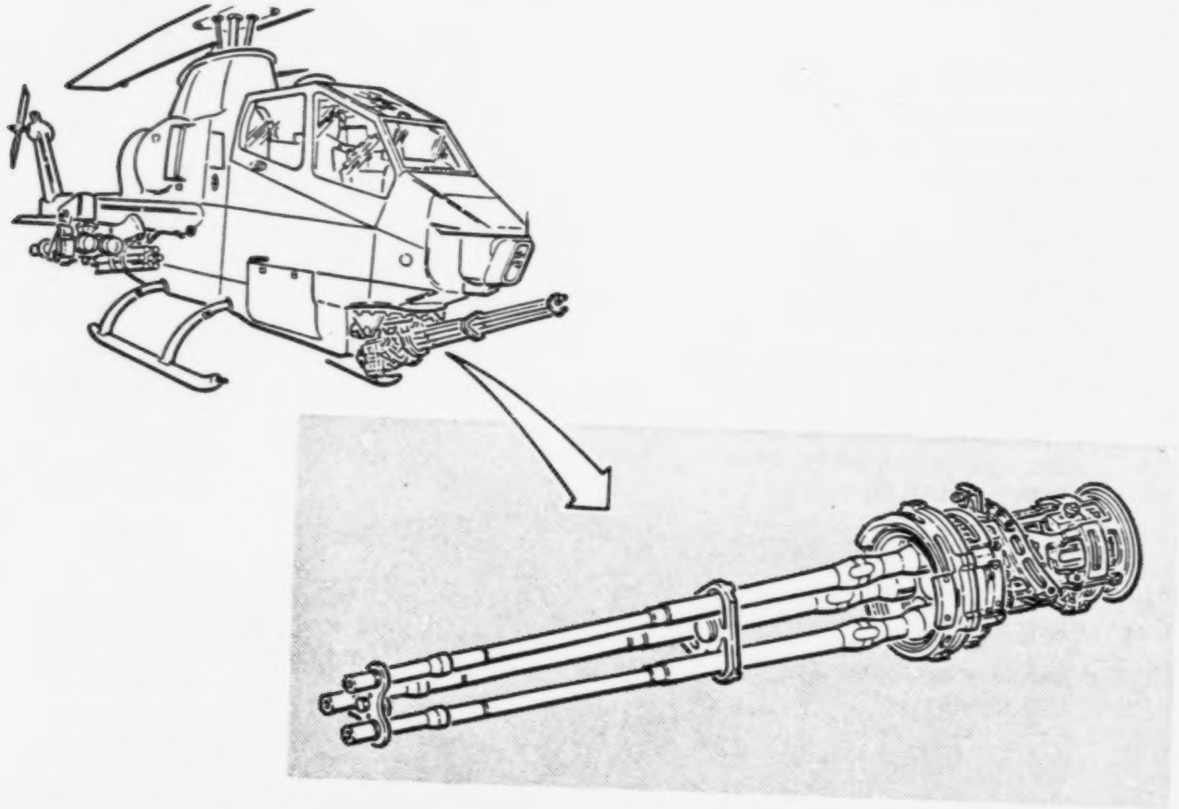
ARR82-27409

END OF TEST

Section VIII. MAINTENANCE OF M197 GUN

Section Contents

	Para
Removal/Installation of M197 Gun Barrels	3-44
Removal of M197 Gun	3-45
Repair of M197 Gun	3-46
Repair of Mid-Barrel Clamp	3-47
Repair of Firing Contact	3-48
Repair of Breech Bolt (11691422)	3-49
Repair of Breech Bolt (11010157)	3-50
Repair of Index Pin	3-51
Installation of M197 Gun	3-52



3-44. REMOVAL/INSTALLATION OF M197 GUN BARRELS

DESCRIPTION

This task covers: Removal and installation.

INITIAL SETUP

Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental

Materials:
  Lumber (Item 8, Appx D)

Personnel Required:
  68M Aircraft Weapon Systems
    Repairer

Equipment Conditions:
  HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP performed, para 2-6.
  Helicopter in designated loading/downloading area.

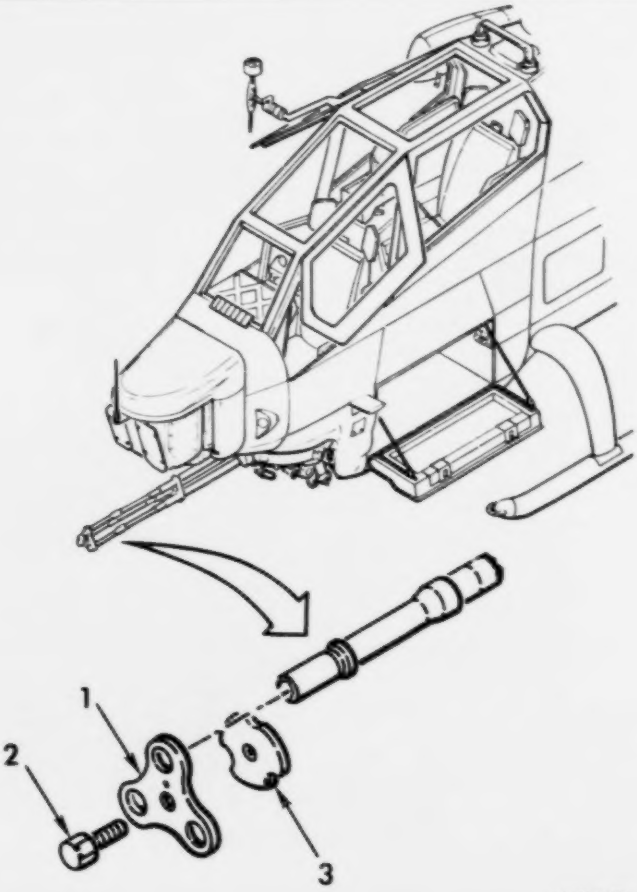
REMOVAL

1. RELEASE ELEVATION DRIVE MOTOR BRAKE AND MANUALLY LOWER BARREL CLUSTER TO APPROXIMATELY LEVEL POSITION. APPLY ELEVATION DRIVE MOTOR BRAKE.

CAUTION

A suitable device, such as a bar or length of wood, should be placed directly behind muzzle clamp plate to prevent barrel cluster distortion.

2. REMOVE MUZZLE CLAMP PLATE (1).
   a. Remove bolt (2) and self-locking nut (3).
   b. Remove muzzle clamp plate (1) from barrels.



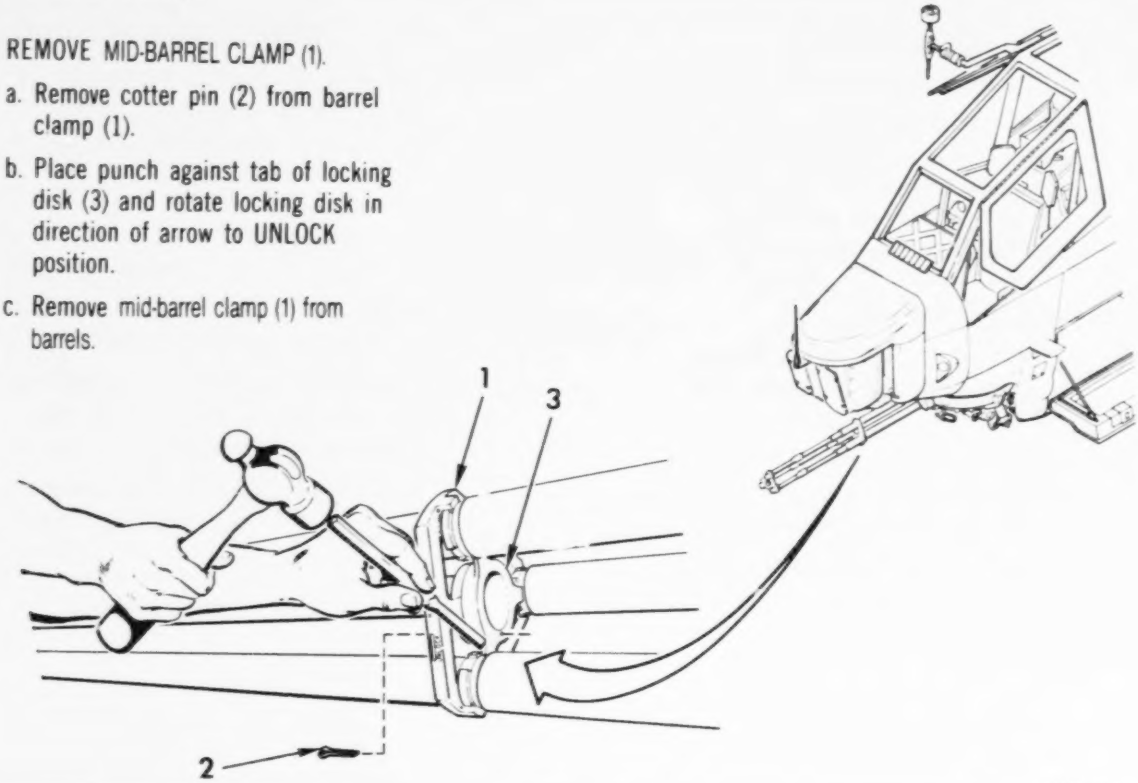
REMOVAL (cont)

3. REMOVE MID-BARREL CLAMP (1).

   a. Remove cotter pin (2) from barrel clamp (1).

   b. Place punch against tab of locking disk (3) and rotate locking disk in direction of arrow to UNLOCK position.

   c. Remove mid-barrel clamp (1) from barrels.



ARR82 25871

NOTE

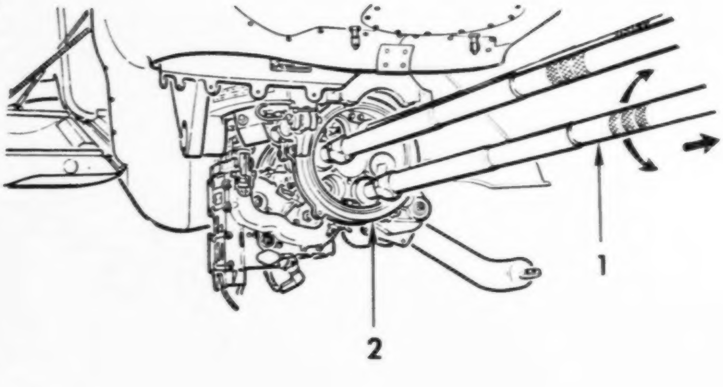
A knurled section is located approximately at mid-barrel to provide a hand grip surface for barrel rotation.

4. REMOVE BARRELS (1).

   a. Rotate barrel (1) approximately 60 degrees in either direction until barrel lugs are disengaged from lugs in rotor (2).

   b. Pull barrel (1) forward to remove from rotor assembly (2).

   c. Repeat steps a. and b. for remaining barrels.



ARR82 25872

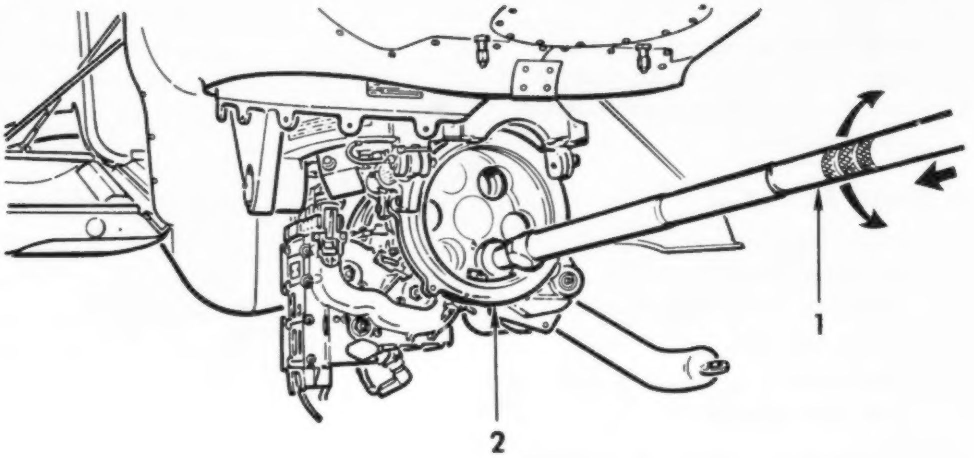
3-44. REMOVAL/INSTALLATION OF M197 GUN BARRELS (cont)

INSTALLATION

WARNING

Improper installation of barrels could allow barrel cluster to separate from M197 gun and result in injury to personnel and damage to equipment.

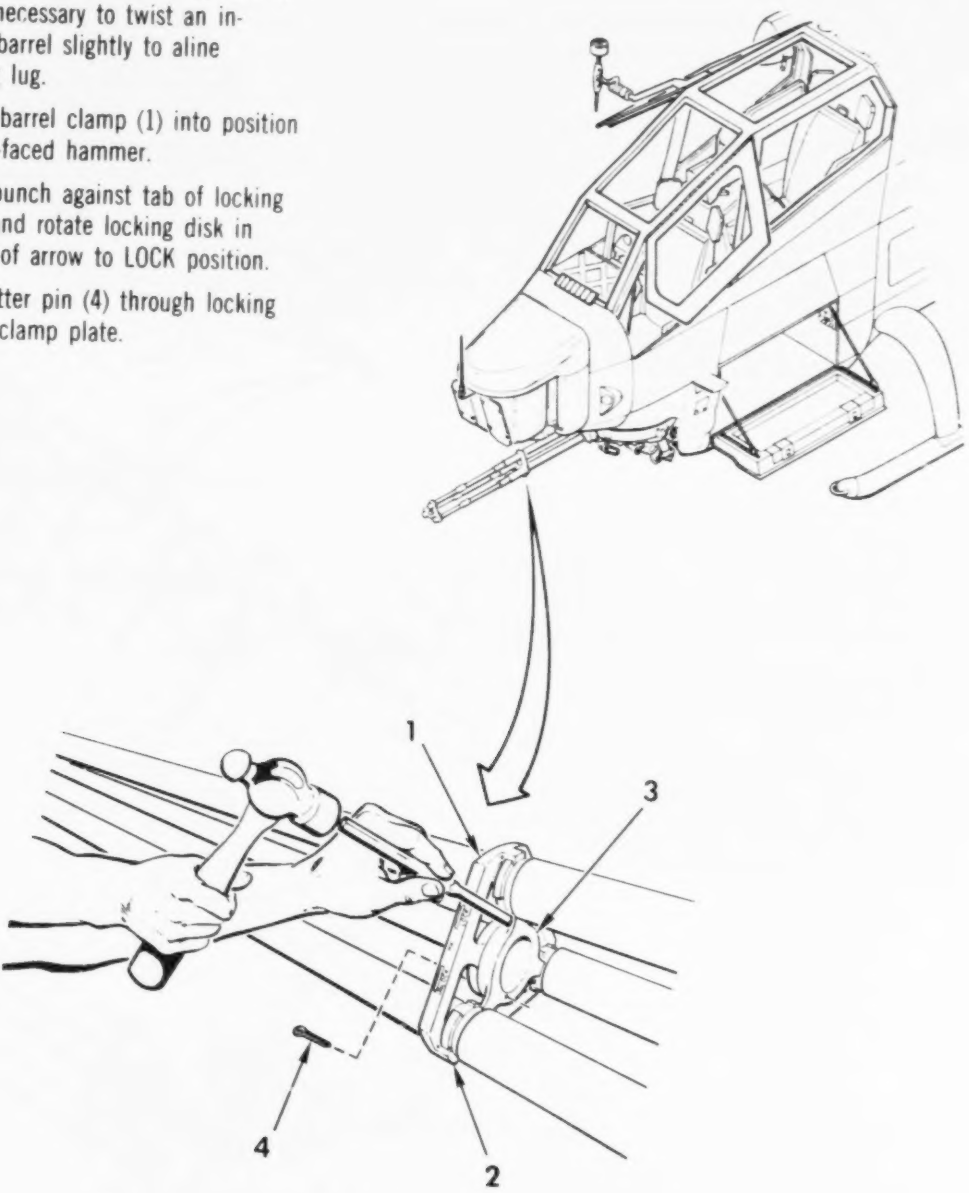
5. INSTALL BARRELS (1).
   a. Install barrel (1) in rotor with interrupted locking lugs on barrel alined with cleared area between locking lugs in rotor (2).
   b. Rotate barrel approximately 60 ° in either direction to lock in place.
   c. After installing first barrel (1), inspect empty holes on either side of installed barrel for presence of locking lugs and visual indication of breech bolts. If either condition exists, barrel is installed in a hole without locking lugs. Remove barrel and install it in a hole with locking lugs.
   d. Repeat step a through c for remaining barrels (1).



ARR82-25873

INSTALLATION (cont)

6. INSTALL MID-BARREL CLAMP (1).
   a. Slide mid-barrel clamp (1) on barrels. Place in approximate mounting position with locating tabs (2) alined with grooves on outside of barrels. It may be necessary to twist an individual barrel slightly to aline mounting lug.
   b. Tap mid-barrel clamp (1) into position with soft-faced hammer.
   c. Place a punch against tab of locking disk (3) and rotate locking disk in direction of arrow to LOCK position.
   d. Install cotter pin (4) through locking disk and clamp plate.



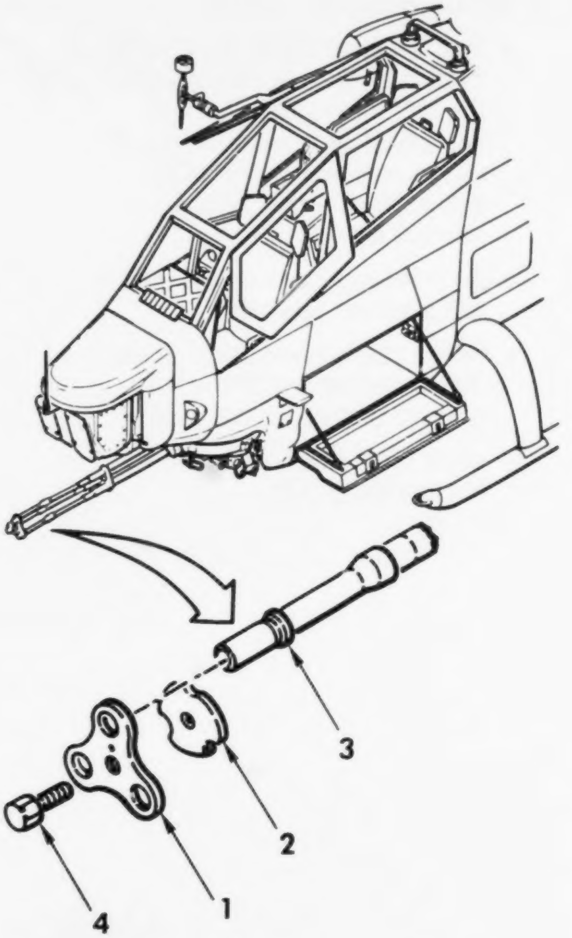
3-44. REMOVAL/INSTALLATION OF M197 GUN BARRELS (cont)

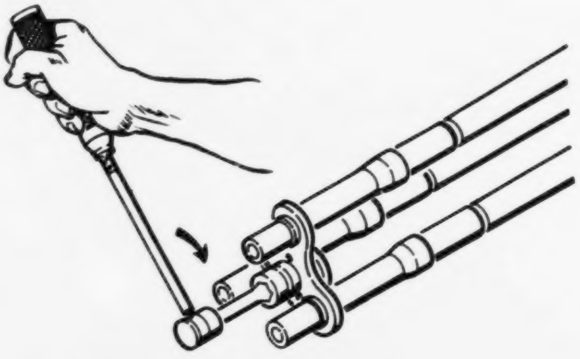
INSTALLATION (cont)

CAUTION

A suitable device, such as a bar or a length of wood, should be placed directly behind muzzle clamp plate to prevent barrel cluster distortion.

7. INSTALL MUZZLE CLAMP PLATE (1).
   a. Place muzzle clamp plate (1) in position on barrels.
   b. Insert self-locking nut (2) between barrels.
   c. Hold self-locking nut (2) against collars (3) and thread bolt (4) into self-locking nut until a minimum of two threads protrude from end of self-locking nut.
   d. Restrain barrel cluster and, using a torque wrench, turn bolt slowly. If torque required to turn bolt is less than 90 lb-in. (10.2 N.m), replace bolt and self-locking nut.
   e. Torque bolt (4) to 63-79 lb-ft (85-107 N.m)
8. RELEASE ELEVATION DRIVE MOTOR BRAKE AND MANUALLY RAISE BARREL CLUSTER TO STOW POSITION. APPLY ELEVATION DRIVE MOTOR BRAKE.





ARR82 25875

END OF TASK

3-45. REMOVAL OF M197 GUN

DESCRIPTION

This task covers: Removal.

INITIAL SETUP

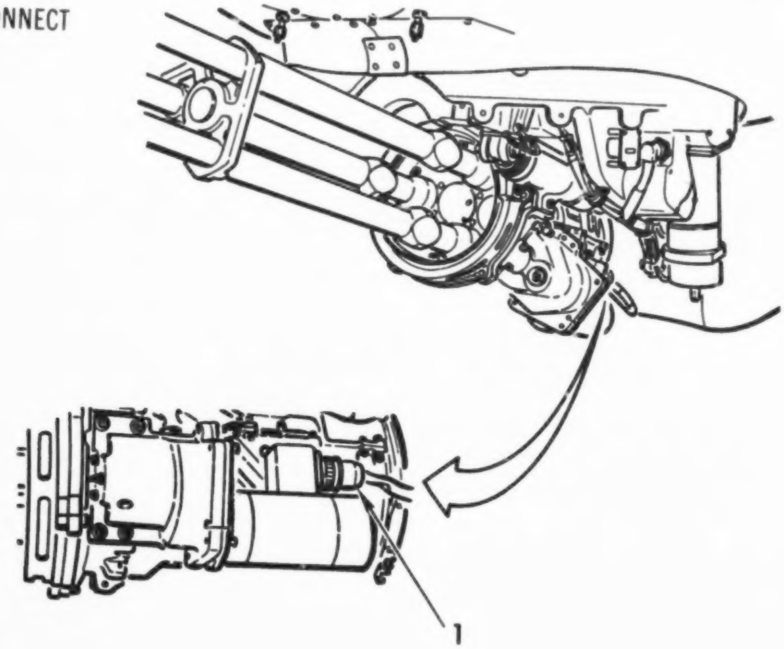
Tools/Test and Support Equipment:
Tool Set, A/C Armament
Repairman: Basic
Tool Set, A/C Armament
Repairman: Supplemental
Gun Lifting Sling (Fig. E-2, Appx E)
Gun Handling Adapter

Personnel Required:
68M Aircraft Weapons System
Repairer (3)

Equipment Conditions:
HELICOPTER ARMAMENT SUBSYSTEMS MAINTENANCE SET-UP performed, para 2-6.
M89E1 feeder removed, see REMOVAL/INSTALLATION OF M89E1 FEEDER, para 3-41.

REMOVAL

1. REMOVE LOCKWIRE AND DISCONNECT CONNECTOR W3P8 (1).

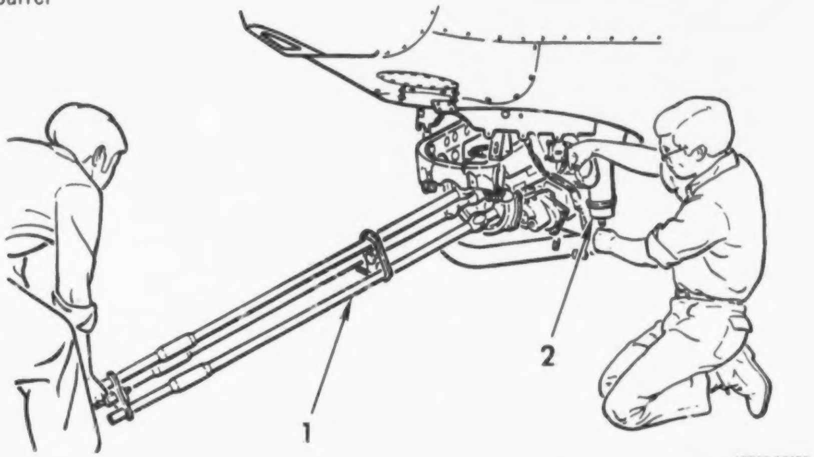


ARR82-27651

3-45. REMOVAL OF M197 GUN (cont)

REMOVAL (cont)

2. LOWER BARREL CLUSTER (1) TO FLOOR.
   a. Position two persons, one at barrel end and one at elevation drive motor (2).
   b. Release elevation drive motor brake and carefully lower barrel cluster (1) to floor.


2
1
ARR82-27652

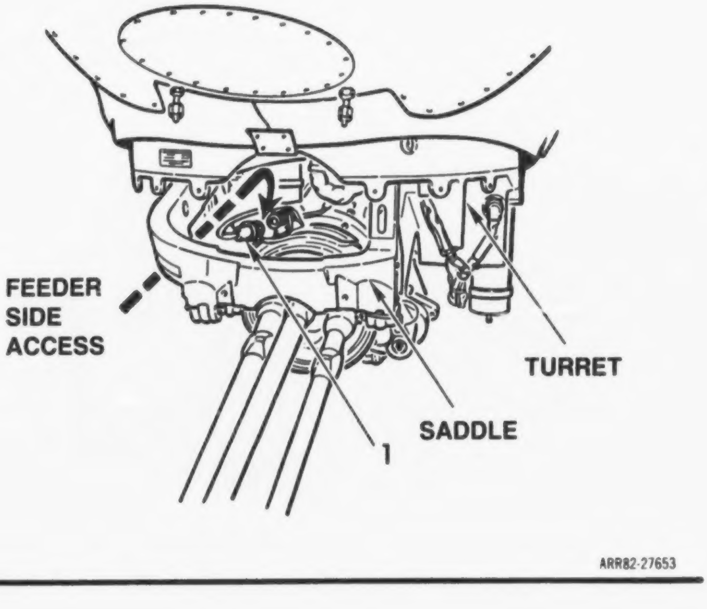
WARNING

To avoid injury, do not put hands between turret and saddle.

CAUTION

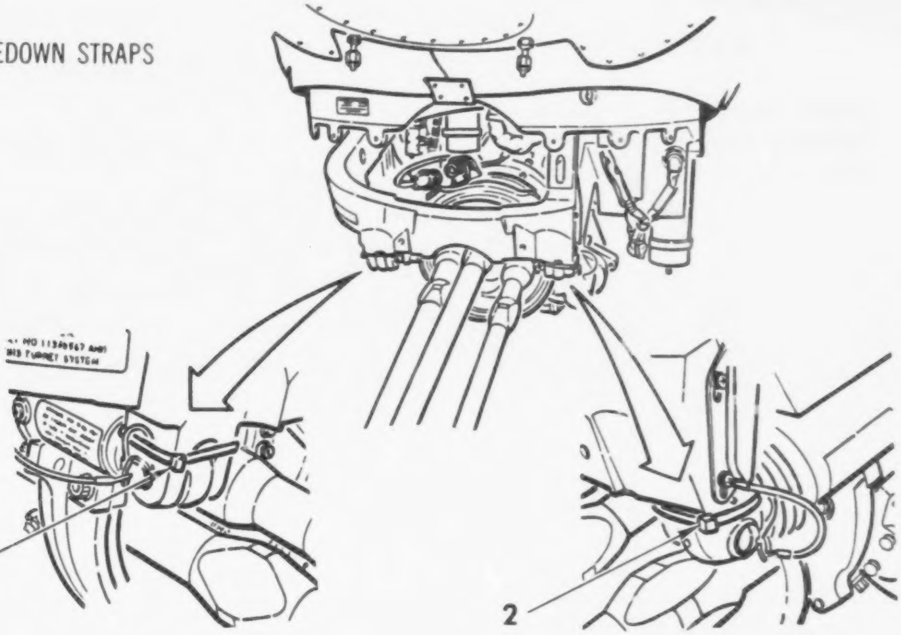
Make sure W2 cable is positioned to prevent damage when M197 gun is removed.

3. REMOVE LOCKWIRE AND DISCONNECT CONNECTOR W2P3 (1).


FEEDER SIDE ACCESS
TURRET
SADDLE
1
ARR82-27653

REMOVAL (cont)

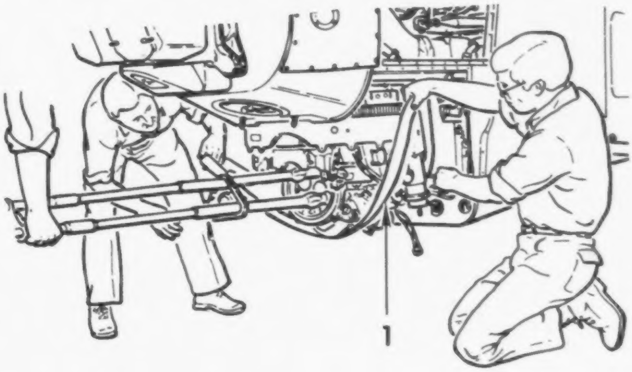
4. REMOVE CABLE TIEDOWN STRAPS (1 AND 2).



ARR82-27654

5. RAISE BARREL CLUSTER TO APPROXIMATELY LEVEL POSITION AND APPLY ELEVATION DRIVE MOTOR BRAKE.

6. POSITION GUN LIFTING SLING (1) WITH CENTER SUPPORT UNDER ROTOR HOUSING.



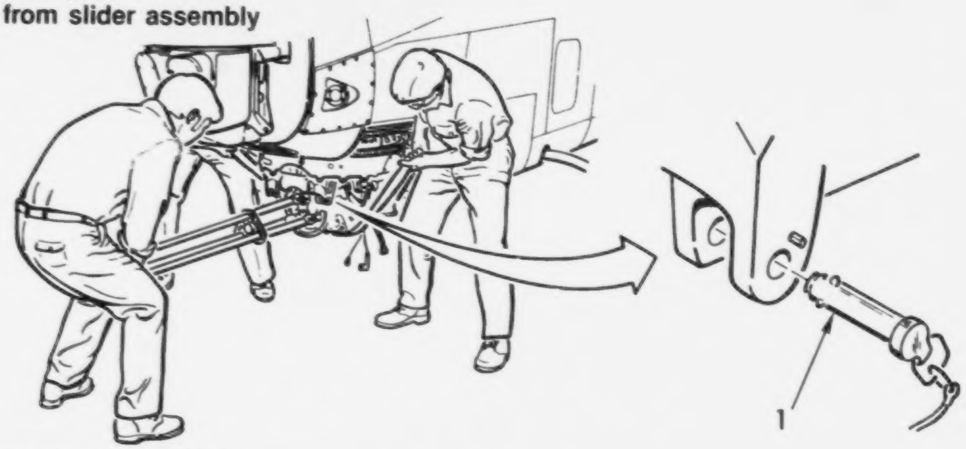
ARR82-27655

3-45. REMOVAL OF M197 GUN (cont)

REMOVAL (cont)

CAUTION

Quick release pins must be removed from slider assembly first.



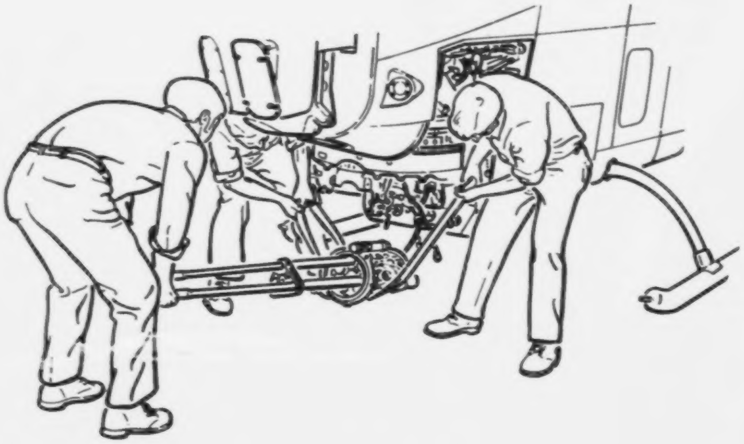
7. WITH THREE PERSONS SUPPORTING M197 GUN, REMOVE TWO QUICK-RELEASE PINS (1).

ARR82-27656

8. LOWER FRONT OF M197 GUN UNTIL RECOIL ADAPTER AND SLIDER CLEAR SADDLE LUGS.

9. SLIDE M197 GUN FORWARD TO DISENGAGE FROM REAR BALL MOUNT.

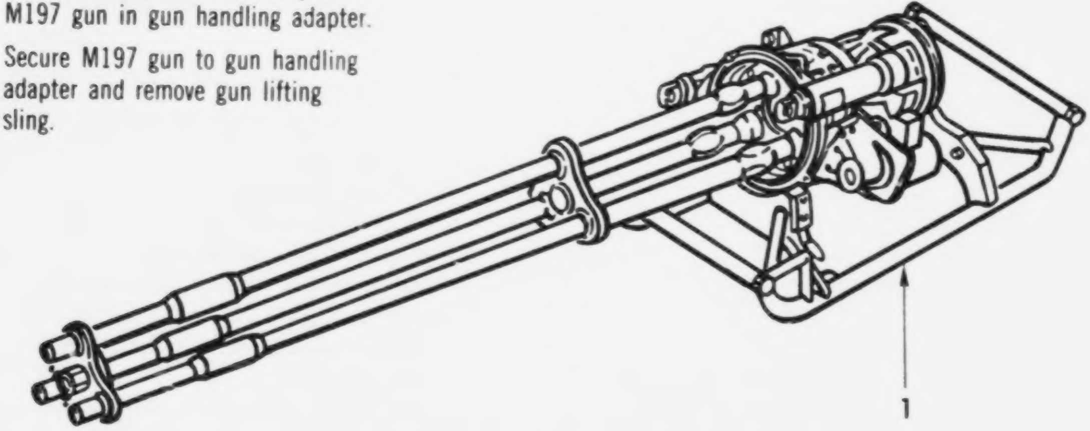
10. CAREFULLY LOWER M197 GUN TO FLOOR.



ARR82-27657

REMOVAL (cont)

11. PLACE M197 GUN IN GUN HANDLING ADAPTER (1).
    a. Position gun handling adapter (1) near M197 gun.
    b. With three persons, lift and place M197 gun in gun handling adapter.
    c. Secure M197 gun to gun handling adapter and remove gun lifting sling.



ARR82-27658

END OF TASK

3-46. REPAIR OF M197 GUN

DESCRIPTION

This task covers: Disassembly, cleaning, inspection, assembly, and checkout.

INITIAL SETUP

Tools/Test and Support Equipment:
- Tool Set, A/C Armament Repairman: Basic
- Tool Set, A/C Armament Repairman: Supplemental
- Bolt Head Lock Installation Tool (Fig E-1, Appx E)

Materials:
- Grease (Item 3, Appx D)
- Lubricant (Item 6, Appx D)
- Lockwire (Item 5, Appx D)
- Lumber (Item 8, Appx D)
- Lumber (Item 9, Appx D)

Personnel Required:
- 68M Aircraft Weapon Systems Repairer

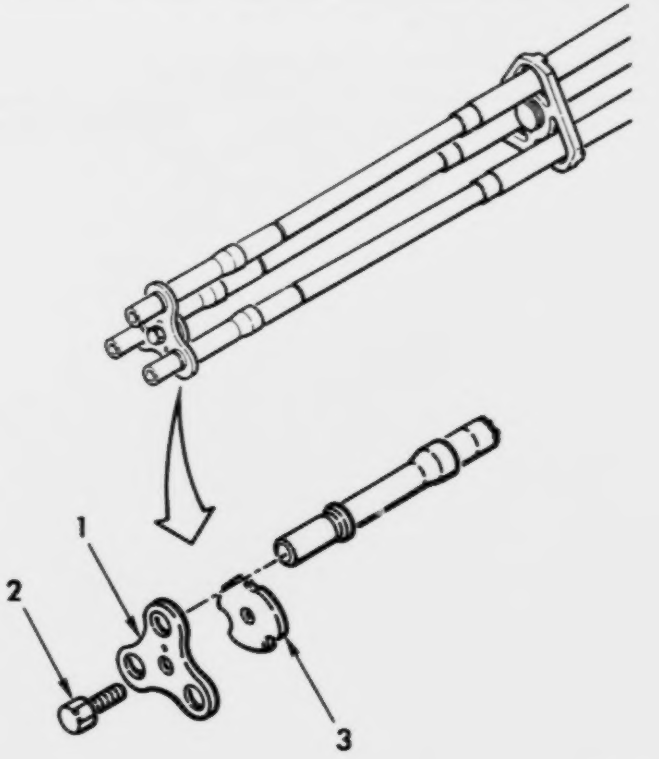
Equipment Conditions:
- REMOVAL OF M197 GUN, performed, para 3-45.
- Gun drive removed, see REMOVAL/INSTALLATION OF GUN DRIVE, para 3-53.
- Recoil adapter and slider removed, see REMOVAL/INSTALLATION OF RECOIL ADAPTER AND SLIDER, para 3-54.

DISASSEMBLY

CAUTION

A suitable barrel restraint, such as a bar or a length of lumber (item 8, Appx D), should be placed directly behind muzzle clamp to prevent barrel cluster distortion.

1. REMOVE MUZZLE CLAMP PLATE (1).
   a. Remove bolt (2) and self-locking nut (3).
   b. Remove muzzle clamp plate (1) from barrels.



AR882-25752

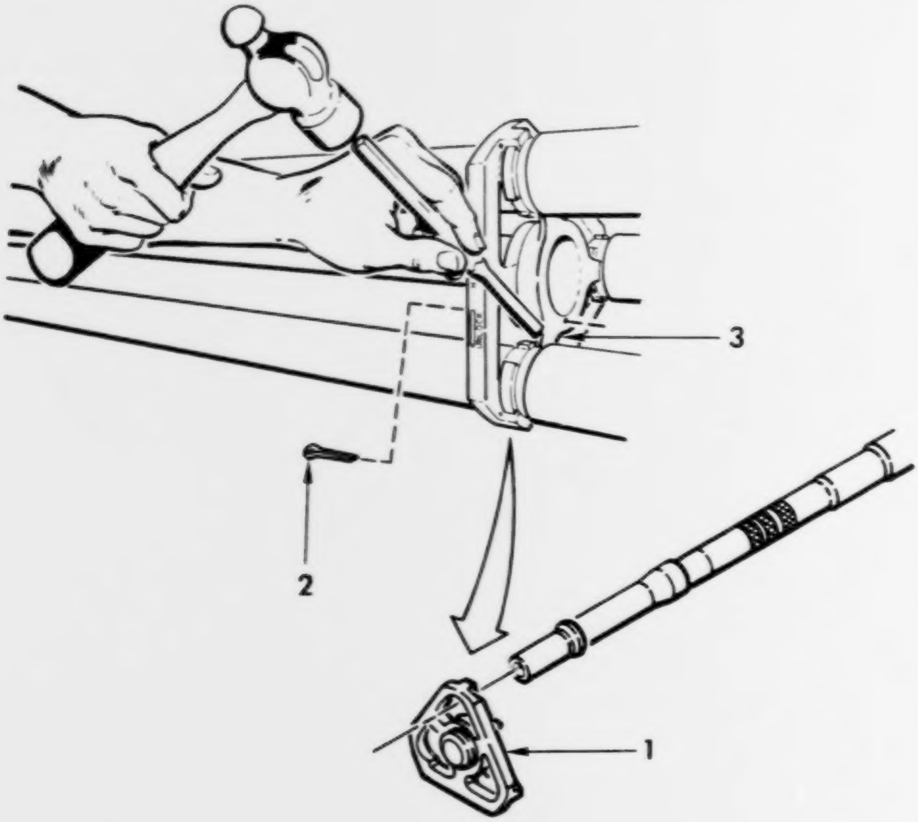
DISASSEMBLY (cont)

2. REMOVE MID-BARREL CLAMP (1).

   a. Remove cotter pin (2) from mid-barrel clamp (1).

   b. Place punch against tab of locking disk (3) and rotate locking disk in direction of arrow to UNLOCK position.

   c. Remove mid-barrel clamp (1) from barrels.



ARR82 25753

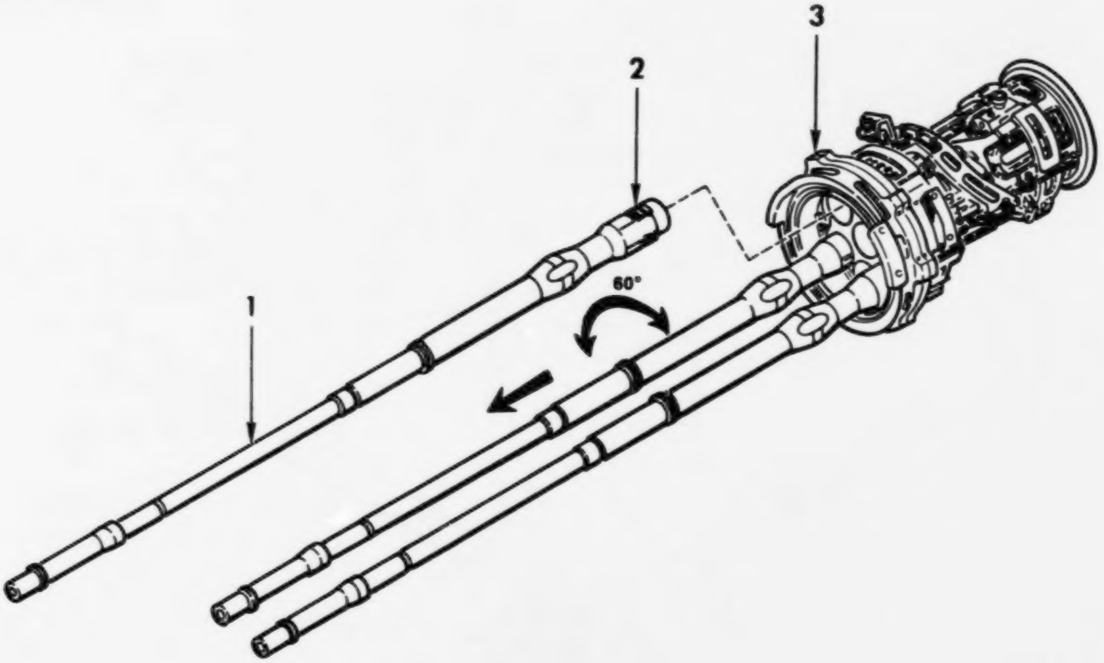
3-46. REPAIR OF M197 GUN (cont)

DISASSEMBLY (cont)

NOTE

A knurled section is located approximately at mid-barrel to provide a hand grip surface for gun barrel rotation.

3. REMOVE BARRELS (1).
   a. Rotate barrel (1) approximately 60 degrees in either direction until barrel lugs (2) are disengaged from lugs in rotor (3).
   b. Pull barrel (1) forward to remove from rotor (3).
   c. Repeat steps a and b for remaining barrels (1).



ARR82-25754

DISASSEMBLY (cont)

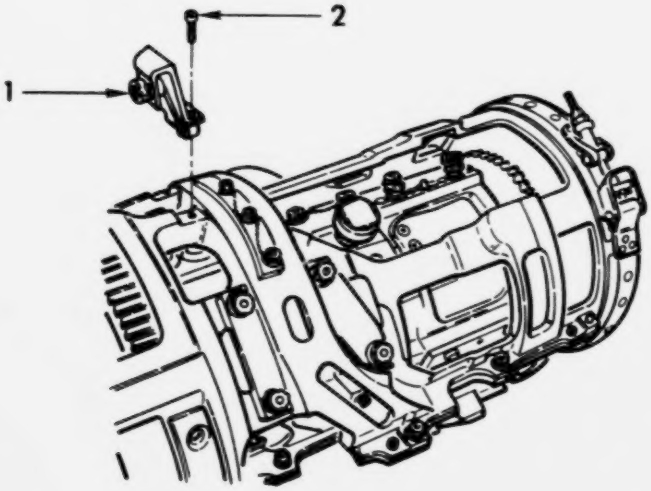
CAUTION

The firing contact support assembly and connector bracket are separate assemblies. Exercise caution during removal; do not bend or damage electrical conductor.

NOTE

If firing contact is separated, electrical conductor must be reinstalled in hole of firing contact cam.

4. REMOVE FIRING CONTACT (1).
   a. Remove lockwire between two screws (2).
   b. Remove two screws (2).
   c. Remove firing contact (1).



ARR82-25755

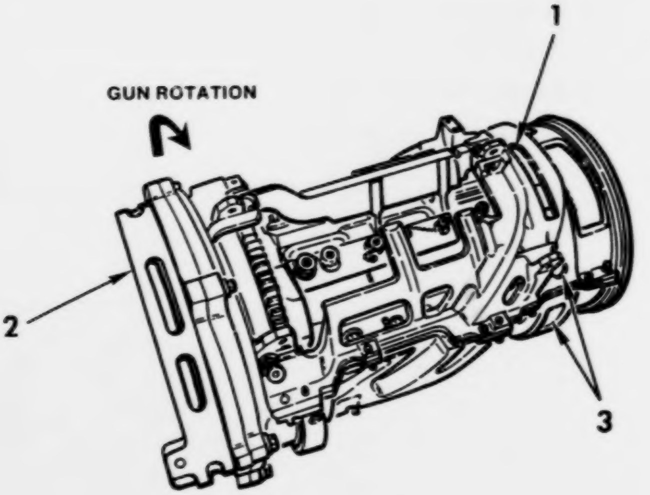
3-46. REPAIR OF M197 GUN (cont)

DISASSEMBLY (cont)

WARNING

To avoid injury, keep hands clear of rotor housing when turning rotor.

5. POSITION BREECH BOLT IN CAM PATH SLOT (1).
   - a. From barrel end of rotor (2), turn rotor, in direction of gun rotation, until a breech bolt appears in cam path slot (1).
   - b. While pushing down hard on breech bolt shaft, through cam path slot (1), turn rotor until breech bolt is diverted into clearing path (3).
   - c. Repeat step b. to start second breech bolt into clearing path (3).

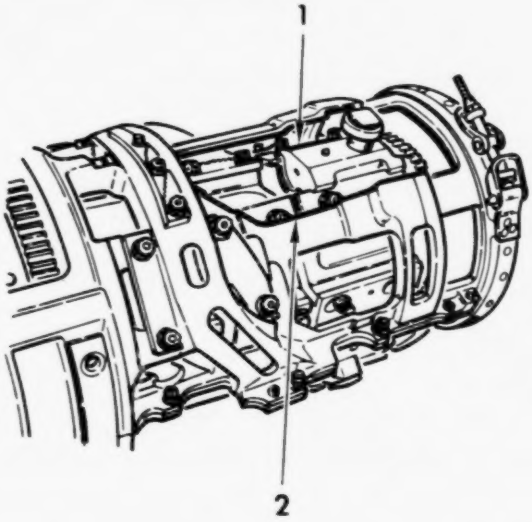


ARR82-25756

DISASSEMBLY (cont)

6. POSITION BREECH BOLT (1) IN ROTOR HOUSING CUTOUT (2).

   Turn rotor until breech bolt (1) is approximately centered in rotor housing cutout (2).

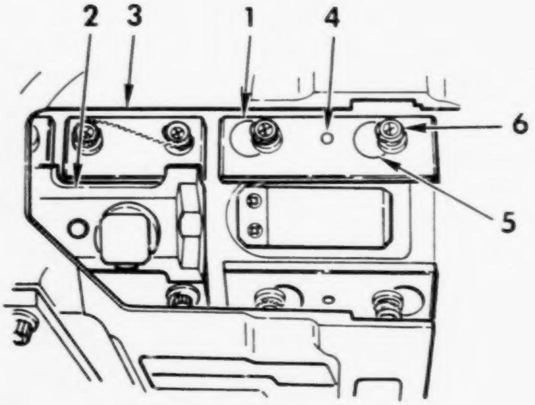


ARR82-25757

7. REMOVE REMOVABLE ROTOR TRACK (1).

   a. Slide breech bolt (2) forward onto center rotor track (3).

   b. While depressing lock pin (4), slide removable rotor track (1) so keyhole (5) is under track spacer (6) and remove removable rotor track.

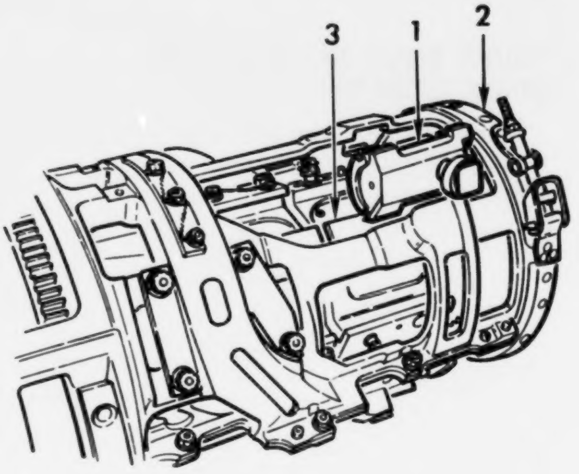


ARR82-25758

3-46. REPAIR OF M197 GUN (cont)

DISASSEMBLY (cont)

8. REMOVE BREECH BOLTS (1).
   a. Slide breech bolt (1) toward coupling clamp (2) until clear of center rotor track.
   b. Remove breech bolt (1) and remaining removable rotor track (3).
   c. Turn rotor until second breech bolt approaches rotor housing cutout, and repeat step 5b to start third breech bolt into clearing path.
   d. Repeat steps 6 through 8b for remaining breech bolts (1).

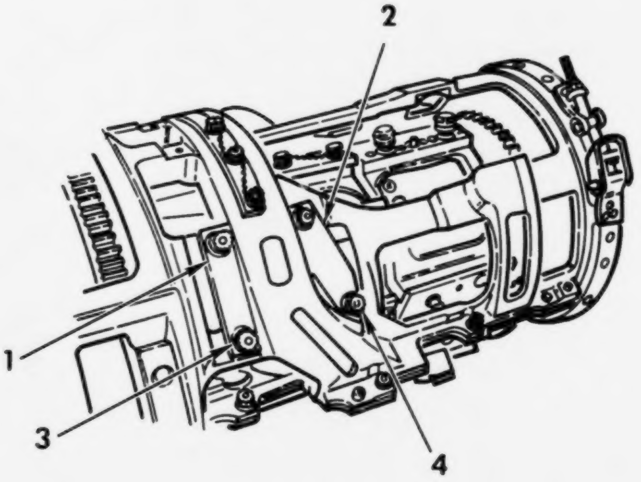


ARR82-25759

NOTE

Identify front and rear unlocking cams as a pair and store together until required for installation.

9. REMOVE FRONT UNLOCKING CAM (1) AND REAR UNLOCKING CAM (2).
   a. Remove two bolts (3) and front unlocking cam (1).
   b. Remove two bolts (4) and rear unlocking cam (2).



ARR82-25760

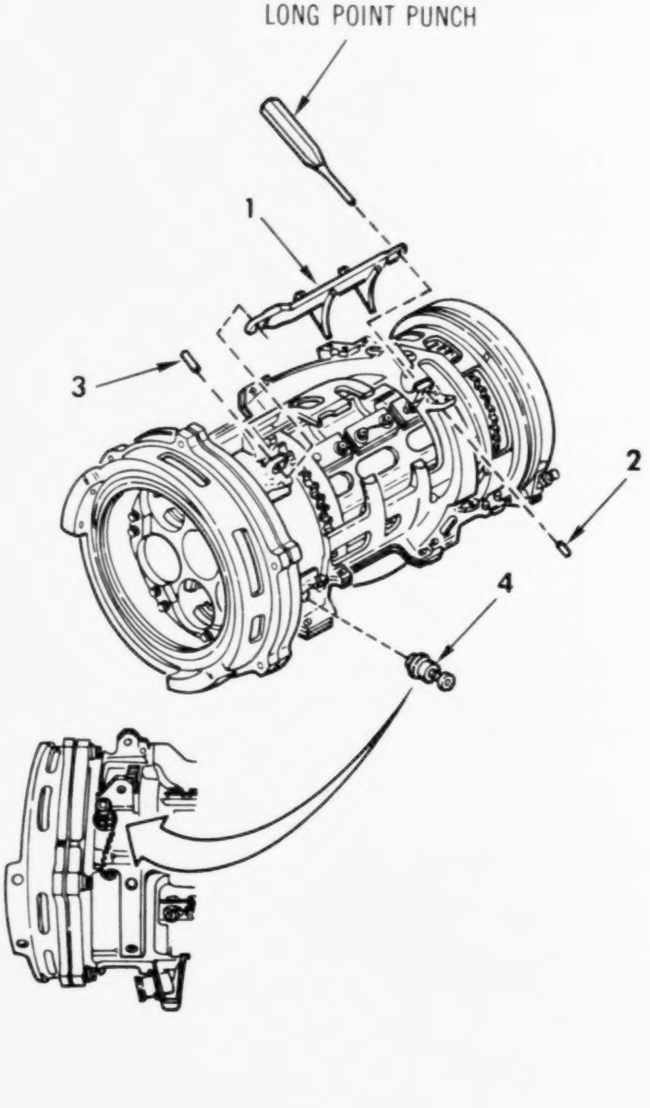
DISASSEMBLY (cont)

CAUTION

A bent guide bar may be difficult to remove from rotor housing. Use caution during removal to prevent rotor housing damage.

10. REMOVE GUIDE BAR (1).
    a. Using a 5/32-inch pin punch with an extra long point, remove spring pin (2) securing aft end of guide bar (1).
    b. Remove spring pin (3) securing forward end of guide bar (1).
    c. Remove guide bar (1).

11. REMOVE INDEX PIN ASSEMBLY (4).
    a. Remove lockwire from index pin assembly (4).
    b. Unscrew index pin assembly (4).



ARR82-25761

3-46. REPAIR OF M197 GUN (cont)

DISASSEMBLY (cont)

WARNING

The laminated shim has extremely sharp edges. Handle shim carefully to avoid injury.

CAUTION

The laminated shim, rotor housing, with related ball bearing, and bearing retainer must be maintained as a matched set to avoid reshimming the M197 gun.

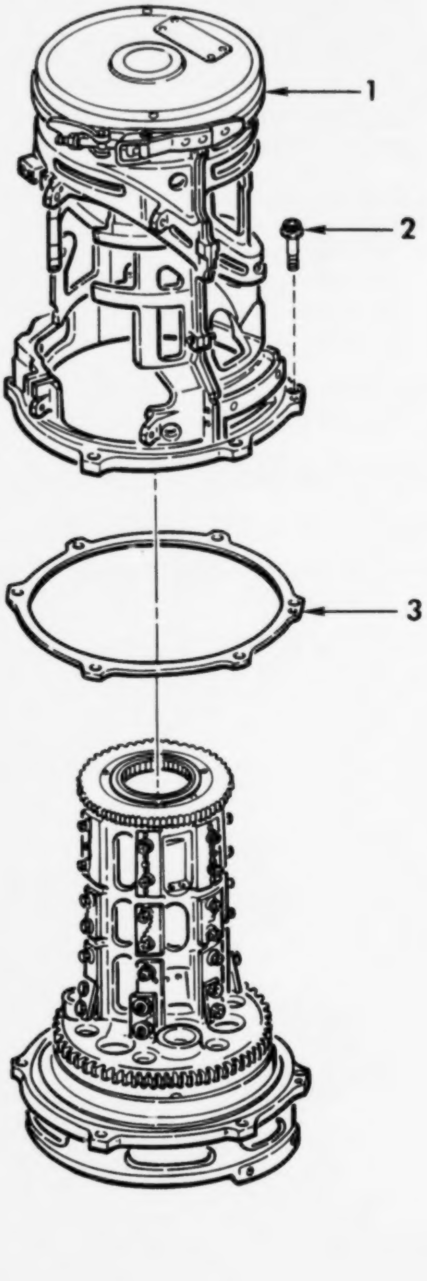
NOTE

If internal damage makes removal impossible, disassemble rotor housing in accordance with step 15.

NOTE

If laminated shim is lost or damaged, M197 gun must be reshimmed.

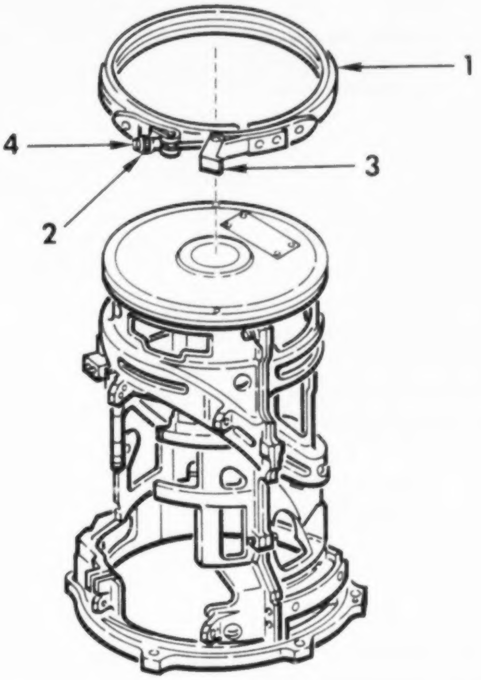
12. REMOVE ROTOR HOUSING (1).
    a. Remove six bolts (2).
    b. Remove rotor housing (1), laminated shim (3), and attach to rotor housing.



ARR82-25762

DISASSEMBLY (cont)

13. REMOVE COUPLING CLAMP (1).
    - a. Loosen nut (2) on coupling clamp (1) until latch (3) can be disengaged from T-bolt (4).
    - b. Raise latch (3) and release bolt (4).
    - c. Remove coupling clamp (1).

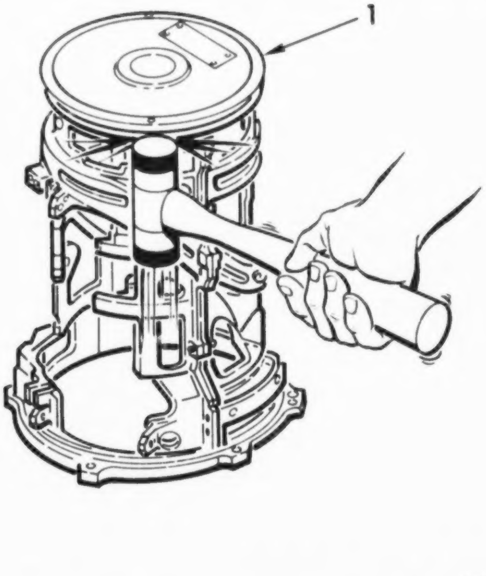


ARR82-25763

NOTE

Make sure alinement pins remain with the rotor housing.

14. USING A SOFT-FACED HAMMER, TAP END PLATE (1) FREE OF ALINEMENT PINS AND REMOVE END PLATE.



ARR82-25764

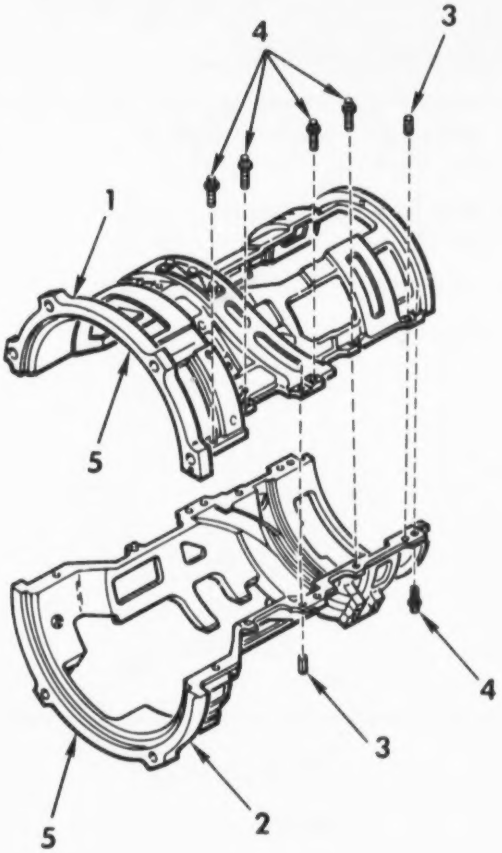
3-46. REPAIR OF M197 GUN (cont)

DISASSEMBLY (cont)

CAUTION

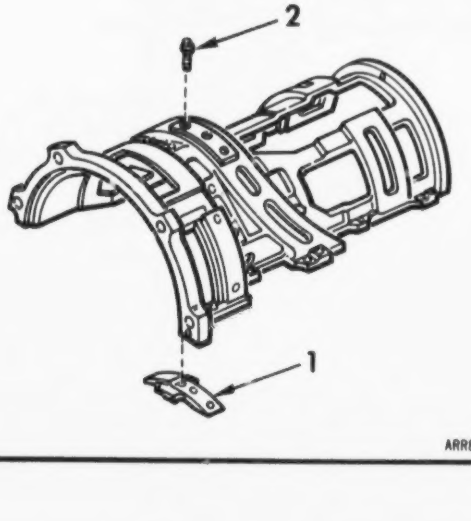
Upper and lower housing bodies should not be separated unless absolutely necessary for maintenance. The upper and lower housing bodies are matched and correspondingly serial numbered. Inadvertent assembly of unmatched upper and lower housings may result in equipment damage.

15. SEPARATE UPPER HOUSING (1) FROM LOWER HOUSING (2).
    - a. Remove four spring pins (3).
    - b. Remove 10 bolts (4).
    - c. Carefully separate upper housing (1) and lower housing (2).
    - d. If stamped matched set numbers (5) are not legible, tie upper housing (1) to lower housing (2) and tag for proper identification during assembly.



ARR82-25765

16. REMOVE CAM LOCK (1).
    - a. Remove lockwire from three bolts (2).
    - b. Remove three bolts (2) and cam lock (1).



ARR82-25766

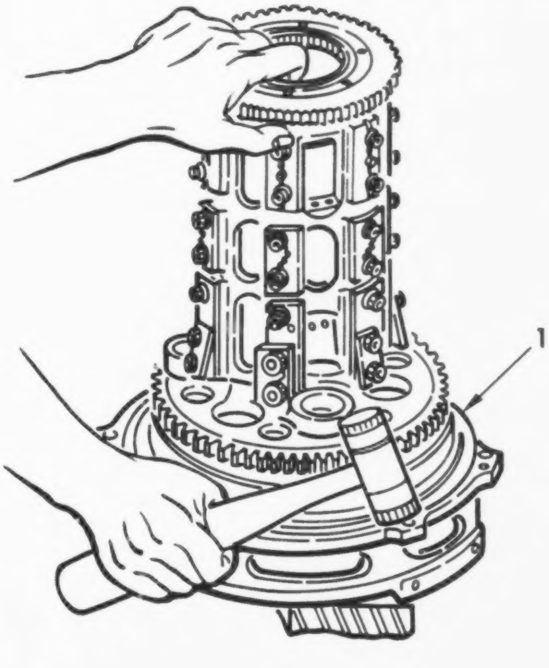
DISASSEMBLY (cont)

CAUTION

The ball bearing, bearing retainer and related laminated shim, and rotor housing must be maintained as a matched set to avoid reshimming the M197 gun.

Tap retainer flange lightly to prevent separation of outer ball bearing races.

17. REMOVE BEARING RETAINER (1).
    a. Place a piece of lumber (item 9, Appx D), approximately 4x4x6 inches (or equivalent), on a suitable working surface.
    b. Place bearing retainer (1) on block. Make certain that sides of bearing retainer are clear of block.
    c. Tap evenly around flange of bearing retainer (1) with soft-faced hammer until bearing retainer is free.
    d. Remove bearing retainer (1).
    e. If annular ball bearing rear seal falls free, secure rear seal to bearing retainer (1).

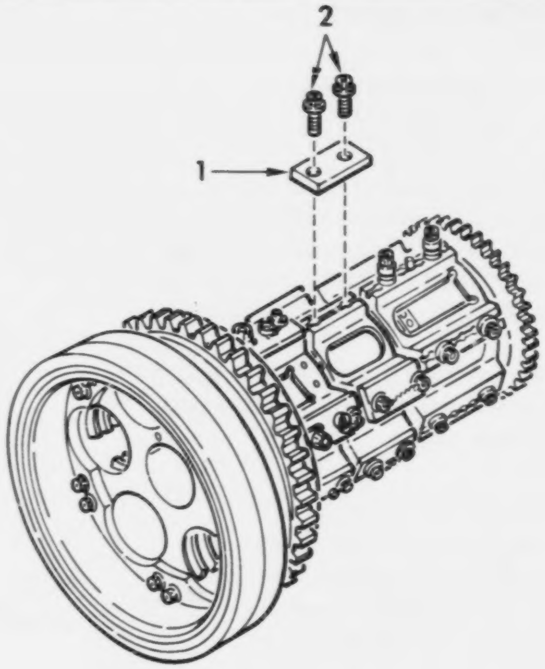


ARR82-25767

3-46. REPAIR OF M197 GUN (cont)

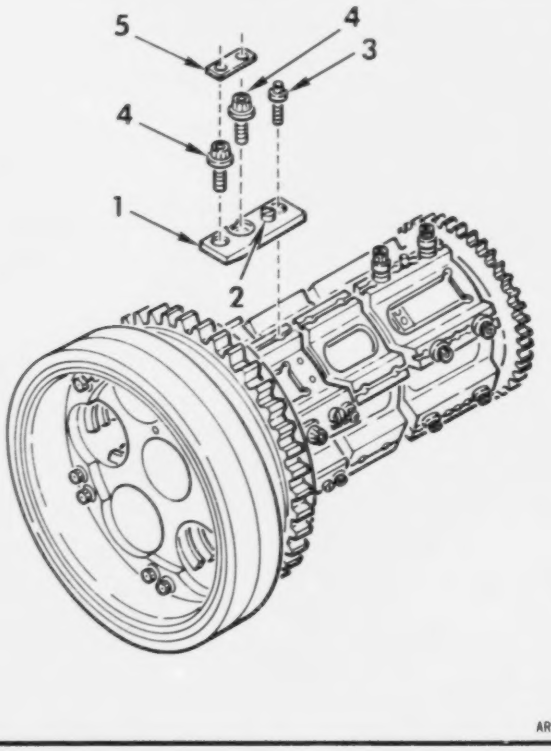
DISASSEMBLY (cont)

18. REMOVE CENTER ROTOR TRACKS (1).
    - a. Remove lockwire from two bolts (2).
    - b. Remove two bolts (2) and center rotor track (1).
    - c. Repeat steps a and b to remove remaining center rotor tracks (1).



ARR82-25768

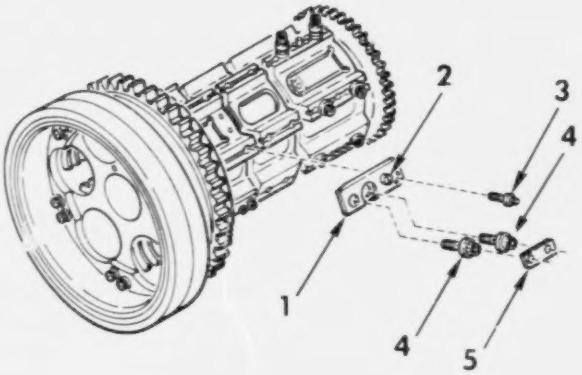
19. REMOVE RIGHT HAND FRONT ROTOR TRACKS (1).
    - a. Remove lockwire from screw (2), and rear bolt (3).
    - b. Remove lockwire from two bolts (4).
    - c. Remove bolt head lock (5).
    - d. If required for maintenance, remove screw (2).
    - e. Remove bolt (3) and two bolts (4).
    - f. Remove right hand front rotor track (1).
    - g. Repeat steps a through f to remove remaining right hand front rotor tracks (1).



ARR82-25769

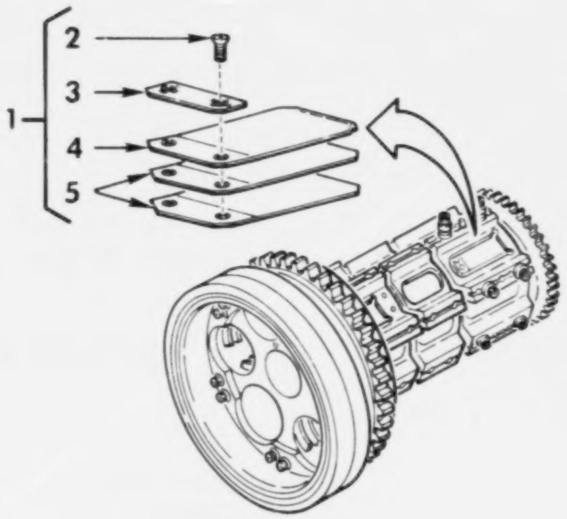
DISASSEMBLY (cont)

20. REMOVE LEFT HAND FRONT ROTOR TRACKS (1).
    a. Remove lockwire from screw (2), and rear bolt (3).
    b. Remove lockwire from two bolts (4).
    c. Remove bolt head lock (5).
    d. If required for maintenance, remove screw (2).
    e. Remove bolt (3) and two bolts (4).
    f. Remove left hand front rotor track (1).
    g. Repeat steps a through f to remove remaining left hand front rotor tracks (1).



ARR82-25804

21. REMOVE LEAF SPRING SET (1).
    a. Remove two screws (2).
    b. Remove plate (3), spring (4), and two springs (5).
    c. Repeat steps a and b to remove remaining leaf spring sets (1).



ARR82-25770

3-46. REPAIR OF M197 GUN (cont)

CLEANING

22. CLEAN ALL PARTS EXCEPT CLAMP PLATE BOLT AND SELF-LOCKING NUT.

    Perform general cleaning procedures in accordance with Section IV.

23. CLEAN SELF-LOCKING NUT.

    Buff threads of self-locking nut with a dry, non-metallic brush and wipe threads clean.

INSPECTION

24. PERFORM GENERAL INSPECTION PROCEDURES IN ACCORDANCE WITH SECTION IV.

25. INSPECT PARTS IN ACCORDANCE WITH TABULATED DATA:

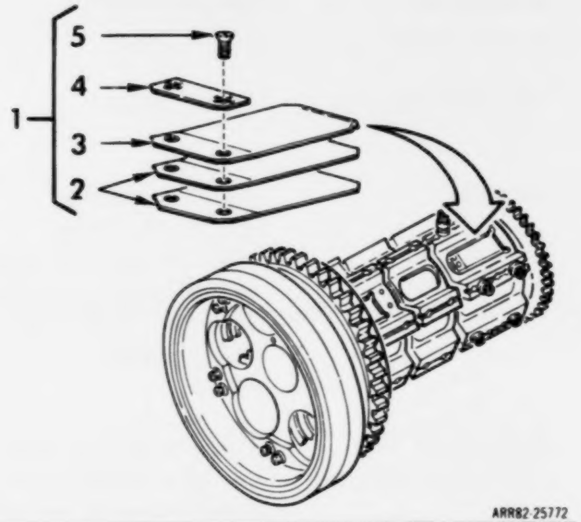
Component	Possible Defect	Remedy
Barrels	Damaged locking lugs or flanges	Replace barrel.
	Cracks, bulges, visible internal pitting or erosion (Erosion is the result of gas cutting and is visually identified by irregular lengthwise grooves just forward of the case neck area. If condition exists, perform BORE EROSION CHECK in PMCS. Loss of chrome plating forward of chamber is permissible.)	Replace barrel.
	Loss of chrome plating in chamber	Replace barrel.
Mid-Barrel Clamp	Bent or damaged locking lugs on clamp plate	Mid-barrel clamp is serviceable if it can be easily installed. Replace mid-barrel clamp if it cannot be easily installed.
	Distorted or cracked clamp plate or locking disk	Replace mid-barrel clamp.
	Missing locking disk spring pin	Replace spring pin.
	Missing retaining ring	Replace retaining ring.
	Missing locking lugs	Replace mid-barrel clamp.

INSPECTION (cont)

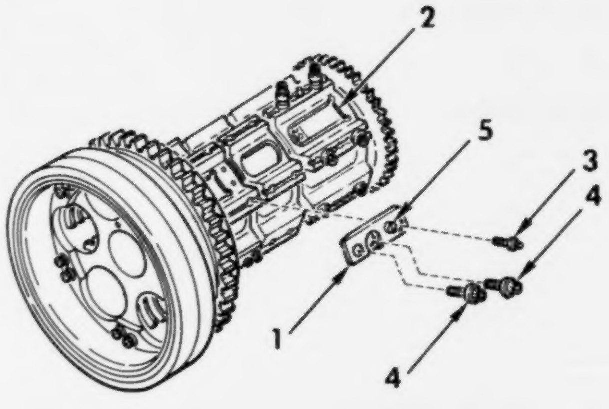
Component	Possible Defect	Remedy
Coupling Clamp	Bent or cracked	Replace coupling clamp.
Front Unlocking Cam	Bent or cracked	Replace both front and rear unlocking cams.
Guide Bar	Snug fit on housing	Replace guide bar.
	Bent body or fingers	Replace guide bar.
	Fingers not parallel to each other and perpendicular to body of guide bar	Replace guide bar.
	Missing finger(s)	Replace guide bar.
	Cracked	Replace guide bar.
Muzzle Clamp Plate, Self-Locking Nut, and Bolt	Cracked or damaged clamp plate	Replace muzzle clamp plate.
	Distorted or dished self-locking nut	Replace bolt and self-locking nut.
	Locking feature of self-locking nut not functioning. Check is performed during installation of muzzle clamp plate.	Replace bolt and self-locking nut if breakaway torque is less than 90 lb-in. (10.2 N.m).
	Stripped threads on bolt	Replace bolt and self-locking nut if breakaway torque is less than 90 lb-in. (10.2 N.m).
Rear Unlocking Cam	Bent or cracked	Replace both front and rear unlocking cams.
Laminated Shim	Cracked, kinked, or broken	Replace laminated shim.
	Separation or delamination	Replace laminated shim.

ASSEMBLY

26. INSTALL LEAF SPRING SET (1).
    a. Place two springs (2) in aft rotor well with screw holes alined.
    b. Place spring (3) on top of springs (2) previously installed.
    c. Place plate (4) on top of springs (2 and 3), with countersunk holes up.
    d. Aline holes of springs (2 and 3) and plate (4) and secure with two screws (5).
    e. Repeat steps a through d to install remaining leaf spring sets (1).



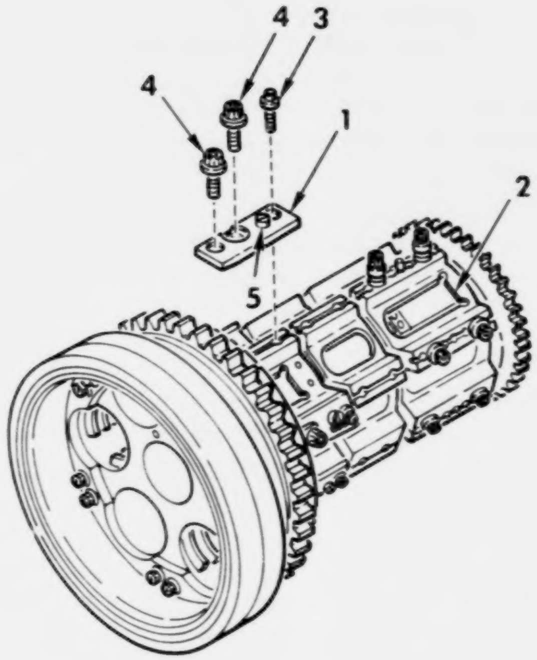
27. INSTALL LEFT HAND FRONT ROTOR TRACK (1).
    a. Orient left hand front rotor track (1), so the extended edge will overhang the bolt path with the leaf spring set (2).
    b. Install left hand front rotor track (1). Lubricate bolt threads with lubricant and secure left front rotor track using bolt (3) and two bolts (4).
    c. If removed, install screw (5).
    d. Torque bolt (3) to 46-50 lb-ft (62-68 N.m).
    e. Torque two bolts (4) to 129-138 lb-ft (175-187 N.m).
    f. Repeat steps a through e for remaining left hand front rotor tracks (1).



ARR82-25773

ASSEMBLY (cont)

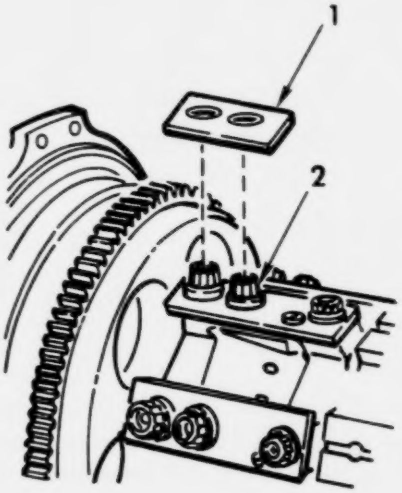
28. INSTALL RIGHT HAND FRONT ROTOR TRACK (1).
    a. Orient right hand front rotor track (1), so the extended edge will overhang the bolt path with the leaf spring set (2).
    b. Install right hand front rotor track (1). Lubricate bolt threads with lubricant and secure right front rotor track using bolt (3) and two bolts (4).
    c. If removed, install screw (5).
    d. Torque bolt (3) to 46-50 lb-ft (62-68 N.m).
    e. Torque two bolts (4) to 129-138 lb-ft (175-187 N.m).
    f. Repeat steps a through e for remaining right hand front rotor tracks (1).



ARR82-25774

29. LUBRICATE BOLT HEAD LOCK (1) AND BOLT HEADS (2) WITH LUBRICANT.

30. PLACE BOLT HEAD LOCK (1) IN MOUNTING POSITION ON BOLT HEADS (2).



ARR82-25775

3-46. REPAIR OF M197 GUN (cont)

ASSEMBLY (cont)

CAUTION

Bolts securing front rotor tracks must be torqued prior to performing following steps.

NOTE

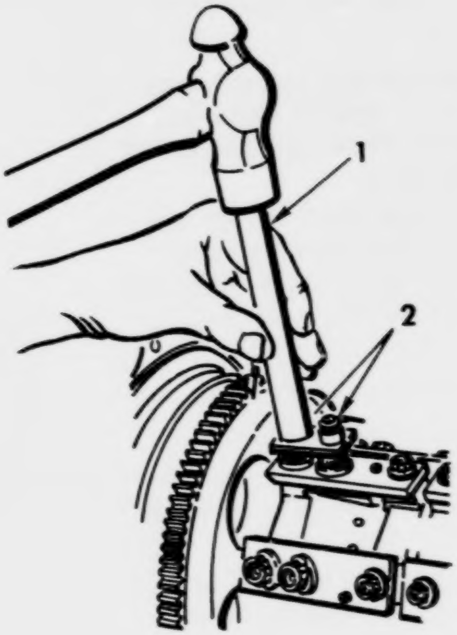
Newly installed bolt head locks may appear distorted or loose. This condition is normal.

31. INSTALL BOLT HEAD LOCKS (1).

    a. Place bolt head lock installation tool (1) in position on bolt head lock (2) over forward bolt and strike tool sharply with a hammer to start bolt head lock over bolt.

    b. Place bolt head lock installation tool (1) in position on bolt head lock (2) over aft bolt and strike tool sharply with a hammer to start bolt head lock over bolt.

    c. Repeat steps a. and b. above, as necessary, to fully seat bolt head lock (2) over bolt heads and allow access to lockwire holes in bolt heads.

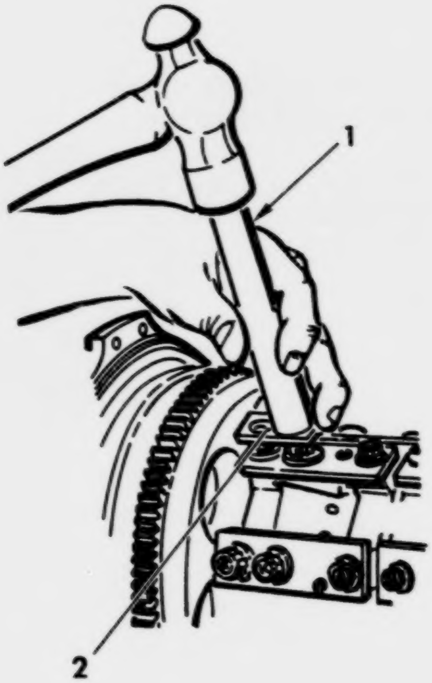


WARNING

WARNING

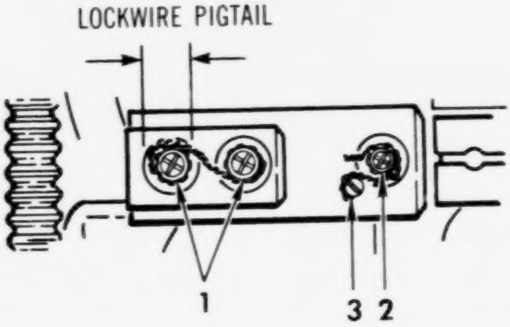
Safety glasses must be worn when using low-pressure compressed air or brush to remove metal chips or dirt to prevent possible eye damage.

    d. After installation of bolt head lock (2), remove chips from area around bolt heads and from rotor using low-pressure compressed air or a fiber bristle brush.



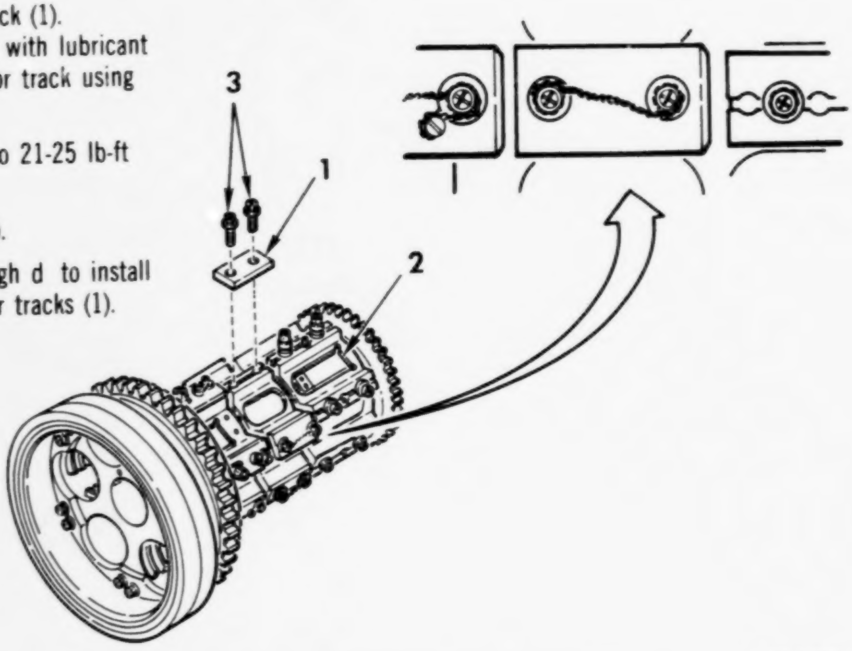
ASSEMBLY (cont)

32. LOCKWIRE BOLTS (1) AND (2).
    a. Lockwire two forward bolts (1).
    b. Lockwire rear bolt (2) and screw (3).
    c. Repeat steps 29 through 32 to install remaining bolt head locks.



ARR82 25777

33. INSTALL CENTER ROTOR TRACKS (1).
    a. Orient center rotor track (1) so the extended edge will overhang the bolt path with the leaf spring set (2).
    b. Install center rotor track (1). Lubricate bolt threads with lubricant and secure center rotor track using two bolts (3).
    c. Torque two bolts (3) to 21-25 lb-ft (28-34 N.m).
    d. Lockwire two bolts (3).
    e. Repeat steps a through d to install remaining center rotor tracks (1).



ARR82-25778

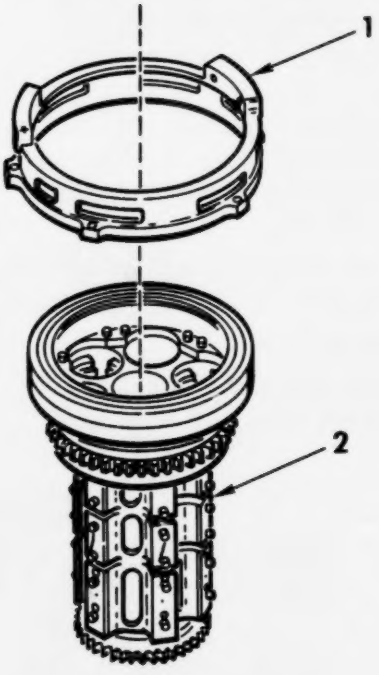
3-46. REPAIR OF M197 GUN (cont)

ASSEMBLY (cont)

CAUTION

Exercise care not to cock bearing retainer on bearing outer race during installation.

34. INSTALL BEARING RETAINER (1).
    a. Stand rotor (2) on a clean surface with rotor gear down.
    b. Place bearing retainer (1) in position on rotor (2) and seat bearing retainer by tapping evenly around bearing retainer with soft-faced hammer.
    c. After installing bearing retainer (1), turn assembly over and set retainer flange on flat surface.
    d. Tap evenly around bearing race with a soft-faced hammer to make sure bearing retainer (1) is fully seated.



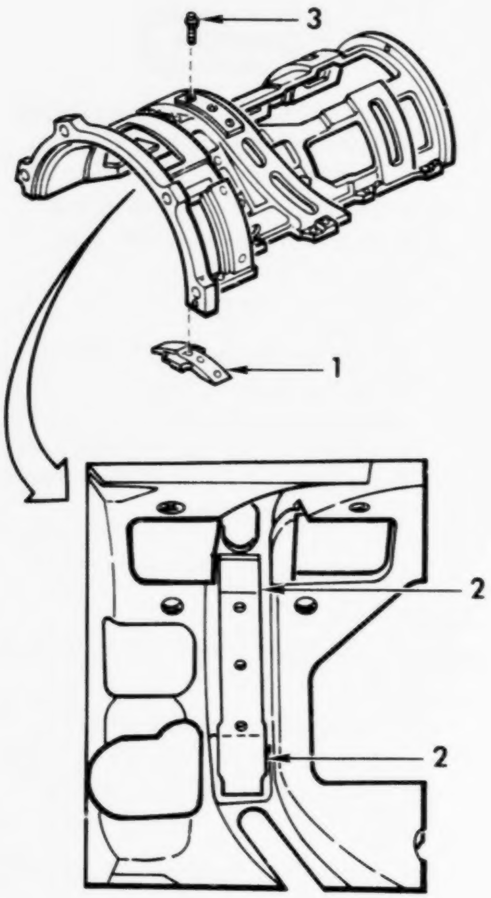
ARR82-25779

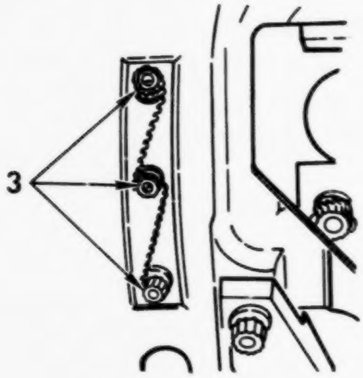
ASSEMBLY (cont)

CAUTION

Make certain that mounting bolts are 0.438 inch long. If mounting bolts are too long, they will protrude into main cam path, and will interfere with rotation of M197 gun.

35. INSTALL CAM LOCK (1).
    a. Place cam lock (1) in mounting position. Make sure that offset portion (2) of cam lock is in recessed groove in cam pathway and firmly butted in direction of rotor rotation.
    b. Lubricate bolt (3) with lubricant and install. Torque bolts to 30-40 lb-in (3-5 N.m). Make sure that bolts do not protrude below cam lock.
    c. Lockwire three bolts (3).





ARR82-25780

3-46. REPAIR OF M197 GUN (cont)

ASSEMBLY (cont)

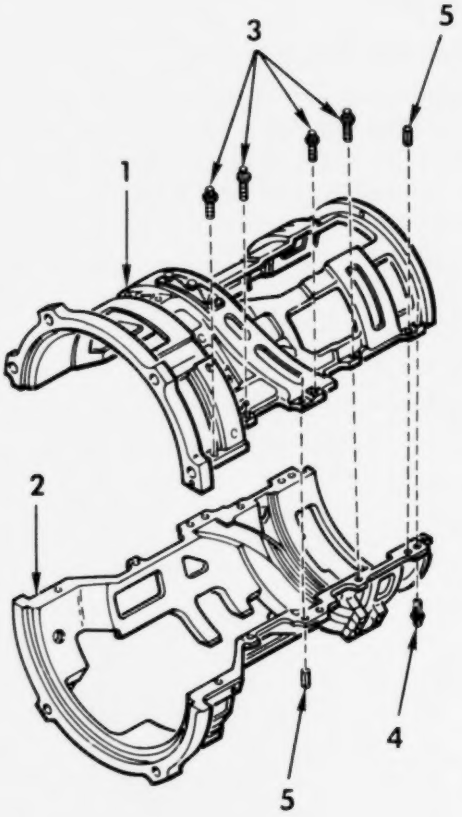
CAUTION

Make sure that upper and lower housing bodies are original matched pair. Assembly of unmatched housing bodies will cause damage to M197 gun.

NOTE

Lubricate upper and lower housing cam paths with lubricant. Spring pin ends should be approximately same distance from face of each flange when correctly installed.

36. ASSEMBLE UPPER HOUSING (1) TO LOWER HOUSING (2).
    a. Install eight bolts (3) and two bolts (4).
    b. Tighten bolts sufficiently to draw upper housing (1) and lower housing (2) together but still permit movement between parts.
    c. Aline spring pin holes in upper and lower housing flanges and install six spring pins (5), one in each hole, and drive into place.
    d. Alternately tighten bolts (3 and 4) evenly to avoid warping parts.
    e. Torque 10 bolts (3 and 4) to 90-100 lb-in (10-11 N.m).



ARR82-25781

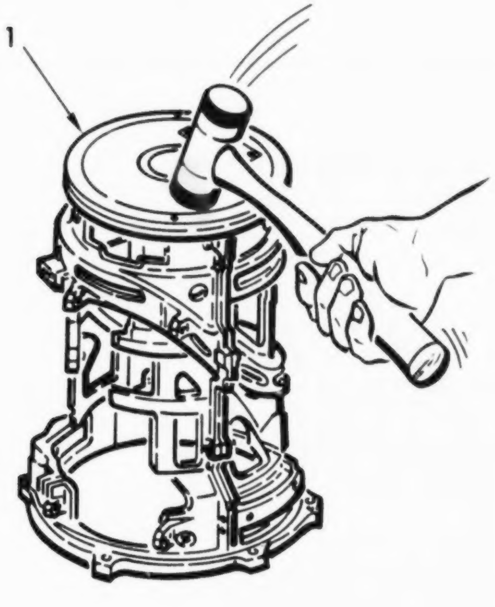
ASSEMBLY (cont)

37. INSTALL END PLATE (1).

   a. On a clean surface, stand assembled rotor housing on wide end.

   b. Position end plate (1) on rotor housing. Aline holes in end plate with rotor housing alinement pins.

   c. Using a soft-faced hammer, tap end plate on alinement pins. Tap until end plate (1) is fully seated.

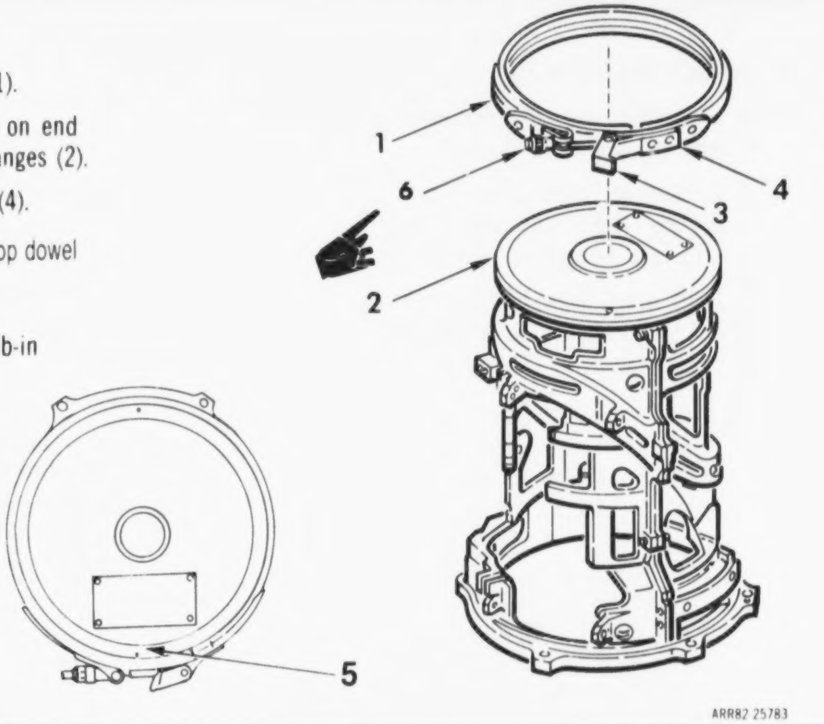


ARR82 25782

3-46. REPAIR OF M197 GUN (cont)

ASSEMBLY (cont)

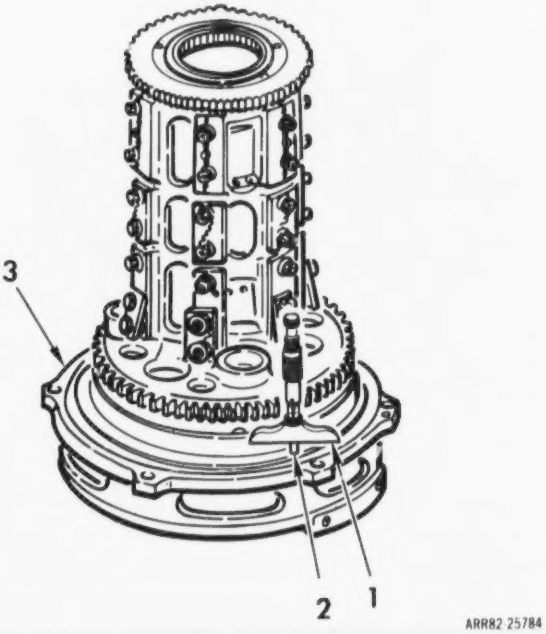
38. INSTALL COUPLING CLAMP (1).
    a. Install coupling clamp (1), on end plate and rotor housing flanges (2).
    b. Engage T-bolt (3) in latch (4).
    c. Aline t-bolt (3) of clamp with top dowel pin hole (5)
    d. Torque nut(6) to 90-100 lb-in (10-11 N.m).



39. PERFORM STEPS (40) THROUGH (47) IF A NEW LAMINATED SHIM AND/OR ROTOR HOUSING IS BEING INSTALLED. IF NOT GO TO STEP (49).

40. USE DEPTH MICROMETER (1) TO MEASURE DISTANCE BETWEEN ROTOR BALL BEARING RACE (2) AND RETAINER FLANGE (3). MAKE CERTAIN THAT MICROMETER DOES NOT CONTACT BEARING SHIELD.

41. MAKE THREE SEPARATE MEASUREMENTS SPACED APPROXIMATELY 120° APART AROUND RETAINER FLANGE. DETERMINE AVERAGE OF THE THREE MEASUREMENTS.

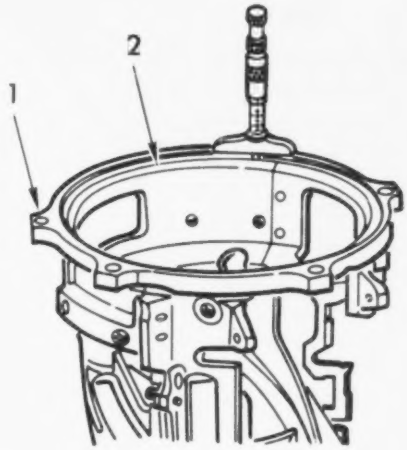


ASSEMBLY (cont)

42. MEASURE DISTANCE BETWEEN HOUSING FLANGE (1) AND BOTTOM OF BEARING SEAT (2).

43. MAKE THREE SEPARATE MEASUREMENTS SPACED APPROXIMATELY 120° APART AROUND HOUSING FLANGE. DETERMINE AVERAGE OF THE MEASUREMENT.

44. SUBTRACT AVERAGE DIMENSION OBTAINED IN STEP (43) FROM AVERAGE DIMENSION OBTAINED IN STEP (41). IF DIMENSION IS AN ODD NUMBER, SUBTRACT 0.003 INCH. IF DIMENSION IS AN EVEN NUMBER, SUBTRACT 0.002 INCH. NOTE DIMENSION OBTAINED.



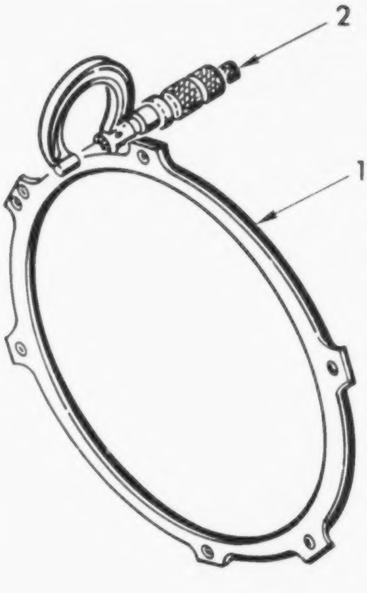
ARR82-25785

WARNING

The laminated shim has extremely sharp edges. Handle shim carefully to avoid injury.

45. MEASURE THICKNESS OF LAMINATED SHIM (1) WITH CALIPER MICROMETER (2) ON TAB AREAS OF SHIM BETWEEN BOLT CUTOUTS. MAKE THREE SEPARATE MEASUREMENTS ON TAB AREAS 120° APART. DETERMINE AVERAGE OF THREE MEASUREMENTS.

46. REQUIRED AVERAGE SHIM THICKNESS OBTAINED IN STEP (44) SHALL EQUAL THE DIMENSION NOTED IN STEP (45). IF AVERAGE SHIM THICKNESS IS LESS THAN THIS DIMENSION, OBTAIN NEW SHIM AND REPEAT STEP (45). IF SHIM AVERAGE THICKNESS EXCEEDS THIS DIMENSION, PROCEED TO STEP (47). IF DIMENSIONS ARE EQUAL, OMIT STEP (47) AND PROCEED TO STEP (48).



ARR82-25786

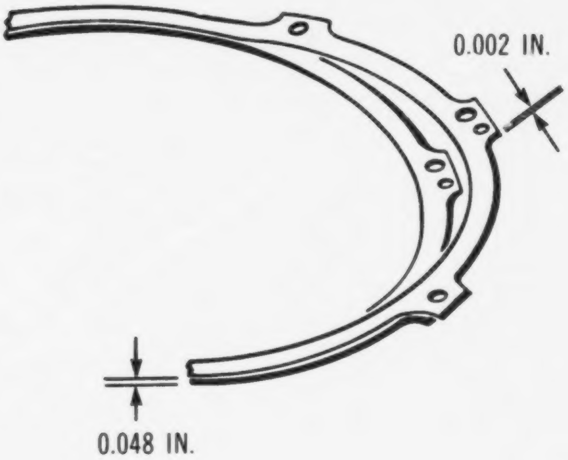
3-46. REPAIR OF M197 GUN (cont)

ASSEMBLY (cont)

NOTE

Laminated shim thickness is 0.048 inch. Each lamina is 0.002 inch thick. Peel shim lamina from rolled edge of shim.

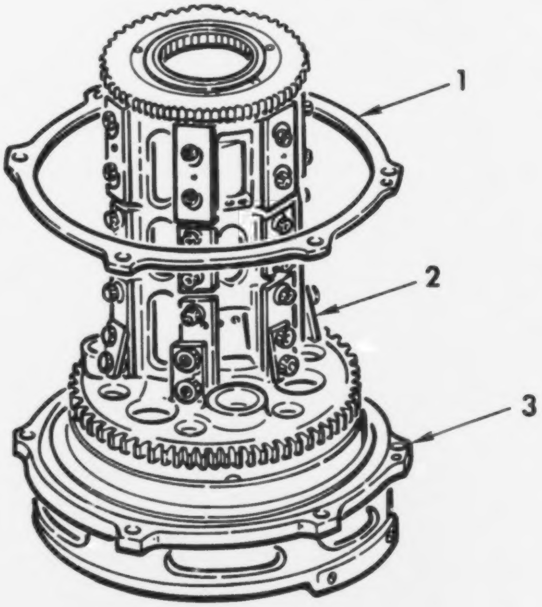
47. DETERMINE AMOUNT AVERAGE SHIM THICKNESS EXCEEDS DESIRED THICKNESS DETERMINED IN STEP (46) AND DIVIDE BY 0.002 INCH TO OBTAIN APPROXIMATE NUMBER OF LAMINA TO BE PEELED FROM SHIM. ALWAYS PEEL LESS THAN ESTIMATED NUMBER AND REPEAT STEP (45) AT INTERVALS NECESSARY TO ENSURE SHIM THICKNESS IS NOT REDUCED BELOW THE REQUIRED DIMENSION.



ARR82-25787

48. INSTALL LAMINATED SHIM (1).

Lower laminated shim (1) over rotor (2) and into position on bearing retainer flange (3) with rolled edge of laminated shim facing bearing retainer flange.



ARR82-25788

ASSEMBLY (cont)

49. LUBRICATE ROTOR GEARS (1), NEEDLE BEARING (2) AND INSTALL ROTOR HOUSING (3).

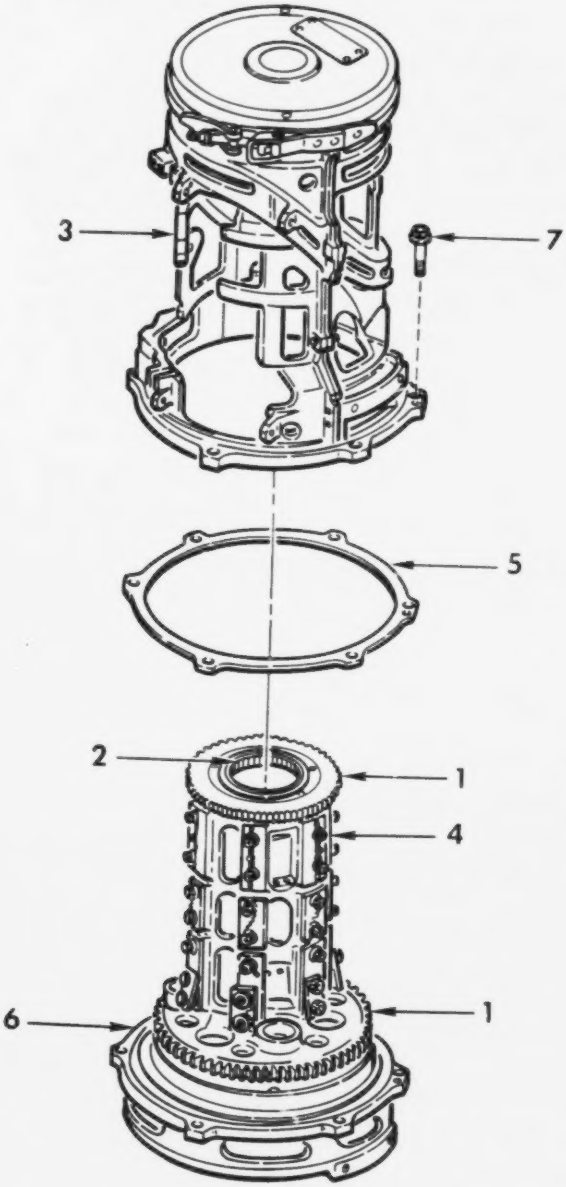
   a. Lubricate rotor gears (1) and needle bearing (2) with grease.

   b. Lubricate walls of rotor housing, cam paths and locking wells with lubricant.

   c. Lower rotor housing (3) over rotor (4) and aline holes in rotor housing, laminated shim (5), and bearing retainer (6). Make sure that recoil adapter pads on rear housing and bearing retainer are alined.

   d. Lubricate bolts (7) with lubricant and install.

   e. Torque bolts (7) to 21-25 lb-ft (28-34 N.m).

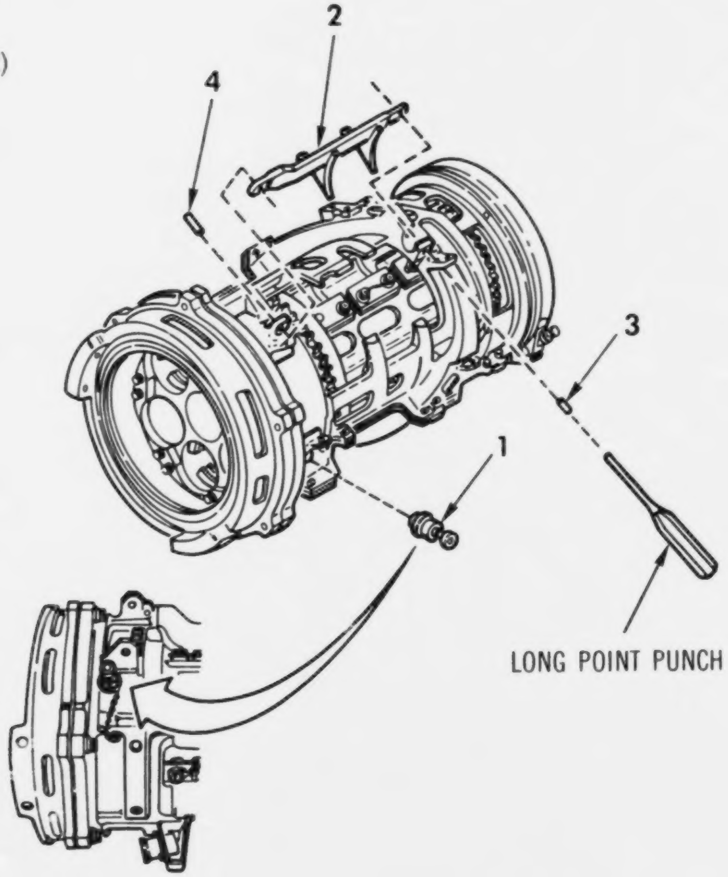


ARR82-25789

3-46. REPAIR OF M197 GUN (cont)

ASSEMBLY (cont)

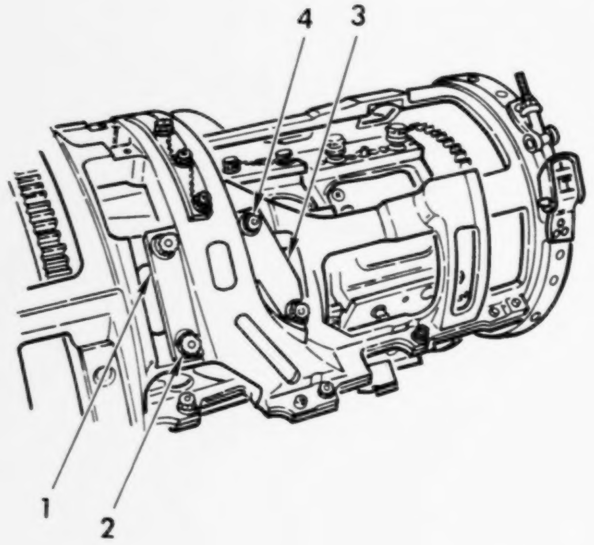
50. INSTALL INDEX PIN ASSEMBLY (1).
    a. Lubricate threads of index pin assembly (1) with lubricant and install index pin assembly.
    b. Lockwire index pin assembly (1).
51. INSTALL GUIDE BAR (2).
    a. Aline rear end of guide bar (2). Use a 5/32-inch pin punch with an extra long point and secure using spring pin (3).
    b. Position forward end of guide bar (2) in mounting tabs and secure using spring pin (4).



ARR82-25790A

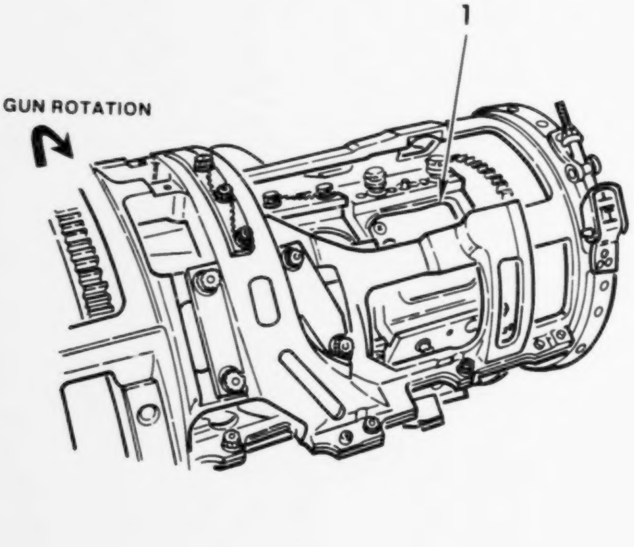
ASSEMBLY (cont)

52. INSTALL FRONT UNLOCKING CAM (1) AND REAR UNLOCKING CAM (3).
    a. Install front unlocking cam (1) and secure using two bolts (2).
    b. Torque bolts (2) to 21-25 lb-ft (28-34 N.m).
    c. Install rear unlocking cam (3) and secure using two bolts (4).
    d. Torque bolts (4) to 21-25 lb-ft (28-34 N.m).



ARR82-25791

53. TURN ROTOR IN DIRECTION OF GUN ROTATION UNTIL A LEAF SPRING SET (1) APPEARS IN ROTOR HOUSING CUTOUT.

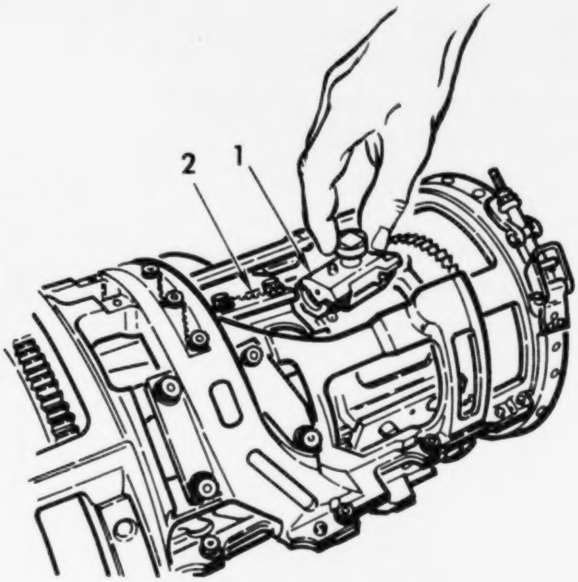


ARR82-25792

3-46. REPAIR OF M197 GUN (cont)

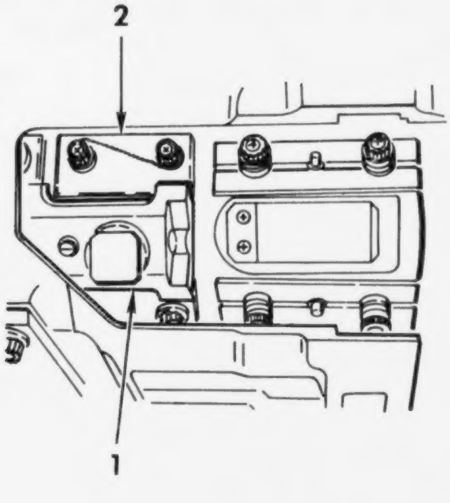
ASSEMBLY (cont)

54. START BREECH BOLT (1) ON CENTER ROTOR TRACKS (2).



ARR82-25793

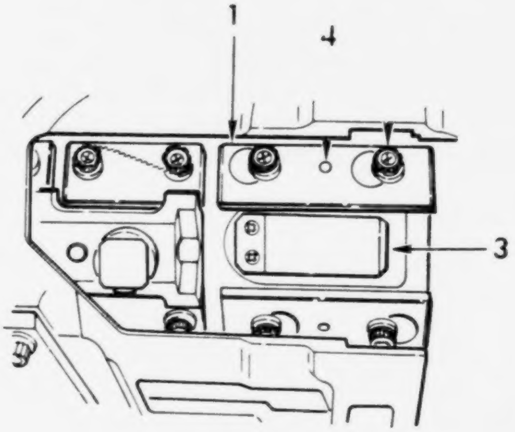
55. SLIDE BREECH BOLT (1) FORWARD ONTO CENTER ROTOR TRACKS (2).



ARR82-25794

ASSEMBLY (cont)

56. INSTALL PAIR OF REMOVABLE ROTOR TRACKS (1).
    a. Place a removable rotor track (1) over track spacers (2), with track key down and extended edge facing leaf spring set (3).
    b. Press removable rotor track (1) down and slide on track spacers (2) until lock pin (4) engages hole in removable rotor track.
    c. Make sure lock pin (4) is fully extended in removable rotor track (1) hole.
    d. Perform steps a. through c. for next removable rotor track (1).



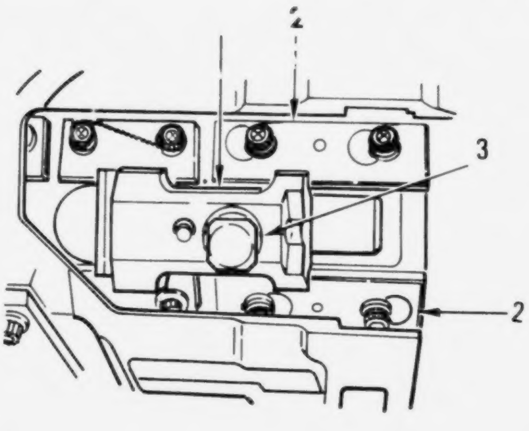
ARR82-25795

57. SLIDE BREECH BOLT (1) REARWARD ONTO REMOVABLE ROTOR TRACKS (2).

58. MAKE SURE BREECH BOLT (1) ENGAGES REMOVABLE ROTOR TRACKS (2) WITHOUT BINDING.

59. PRESS DOWN HARD ON BREECH BOLT ROLLER SHAFT (3) AND DIRECT BREECH BOLT INTO CLEARING CAM AS ROTOR IS ROTATED TO NEXT POSITION.

60. PERFORM STEPS 53 THROUGH 59 FOR REMAINING BREECH BOLTS (1).



ARR82-25796

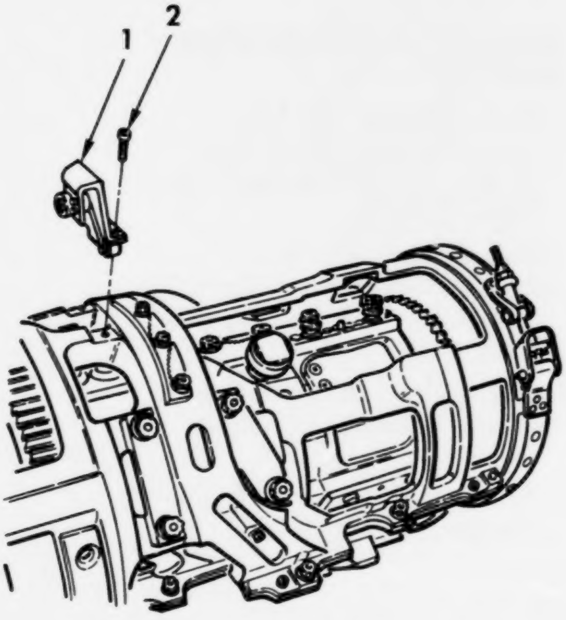
3-46. REPAIR OF M197 GUN (cont)

ASSEMBLY (cont)

CAUTION

The firing contact support and connector bracket are separate assemblies. Use caution during installation; do not bend or damage the electrical conductor.

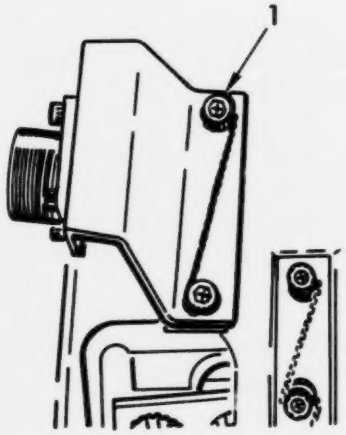
61. INSTALL FIRING CONTACT (1).
    a. Install firing contact (1) on rotor housing with front edge of firing contact support in contact with rotor housing cutout and held laterally toward direction of gun rotation.
    b. If firing contact becomes separated, make sure electrical conductor is reinstalled in cam.
    c. Lubricate screws (2) with lubricant and install.
    d. Torque screws (2) to 23-32 lb-in (3-4 N.m).



ARR82-25797

---

62. LOCKWIRE FIRING CONTACT SCREWS (1).



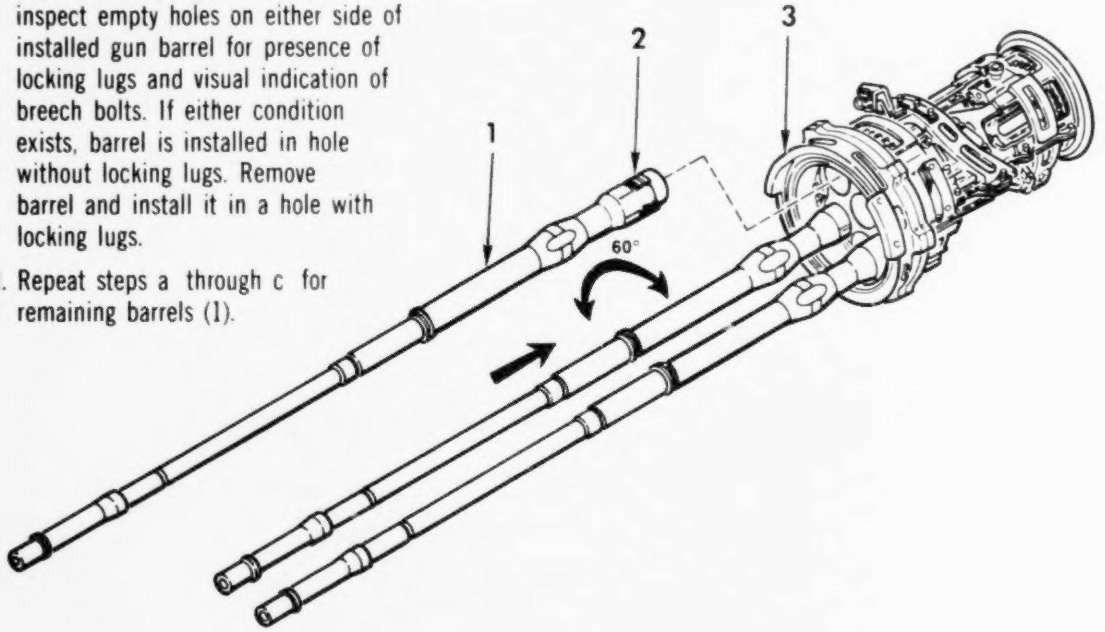
ARR82-25798

ASSEMBLY (cont)

WARNING

Improper installation of barrels could allow barrel cluster to separate from M197 gun and result in injury to personnel and damage to equipment.

63. INSTALL BARRELS (1).
   a. Install barrel (1) in rotor with interrupted locking lugs (2) on barrel alined with cleared area between locking lugs in rotor (3).
   b. Rotate barrel approximately 60° in either direction to lock in place.
   c. After installing first barrel (1), inspect empty holes on either side of installed gun barrel for presence of locking lugs and visual indication of breech bolts. If either condition exists, barrel is installed in hole without locking lugs. Remove barrel and install it in a hole with locking lugs.
   d. Repeat steps a through c for remaining barrels (1).



ARR82 25799

3-46. REPAIR OF M197 GUN (cont)

ASSEMBLY (cont)

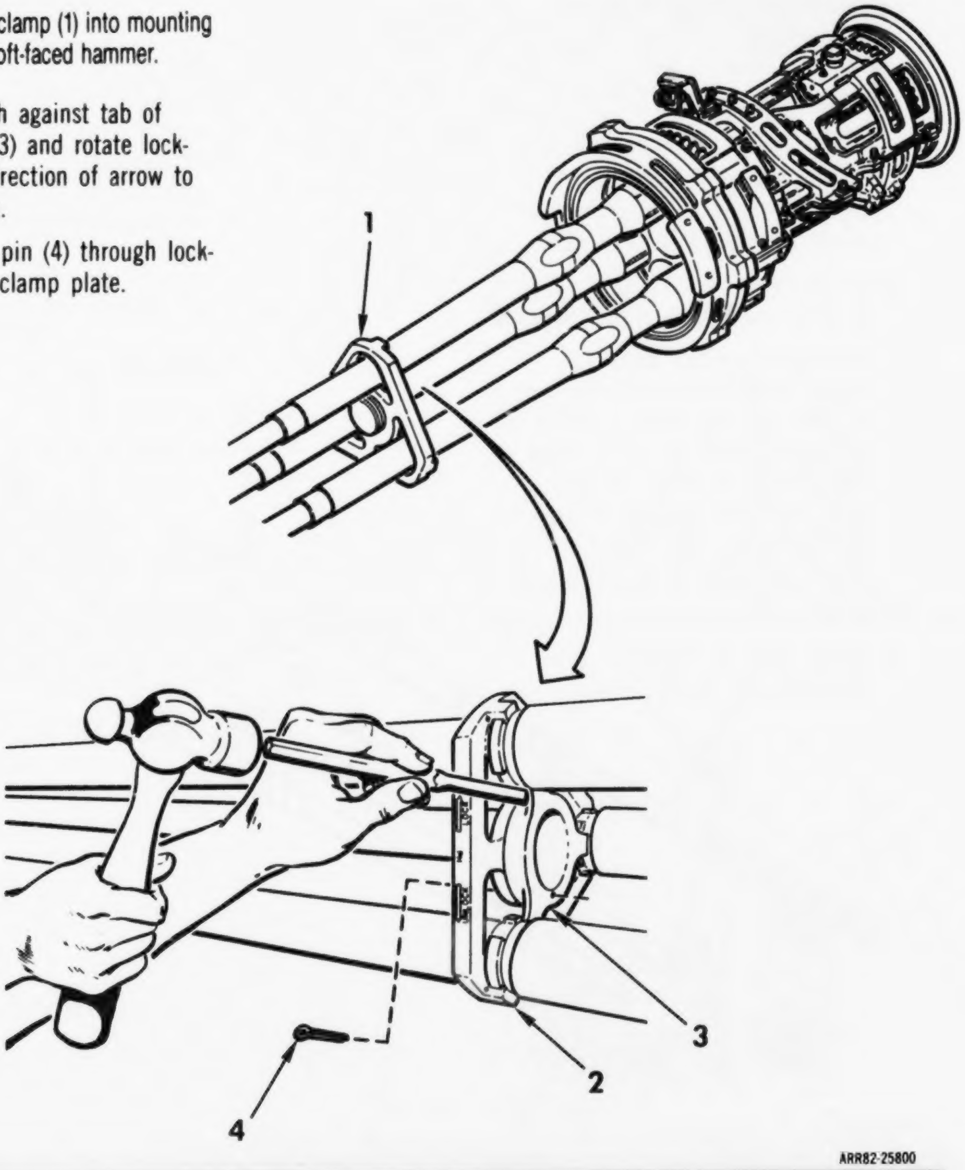
64. INSTALL MID-BARREL CLAMP (1).

    a. Slide mid-barrel clamp (1) on barrels. Place in approximate mounting position with locating tabs (2) alined with the grooves on outside of gun barrels. It may be necessary to twist barrel slightly to aline mounting lug.

    b. Tap mid-barrel clamp (1) into mounting position with soft-faced hammer.

    c. Place a punch against tab of locking disk (3) and rotate locking disk in direction of arrow to LOCK position.

    d. Install cotter pin (4) through locking disk and clamp plate.

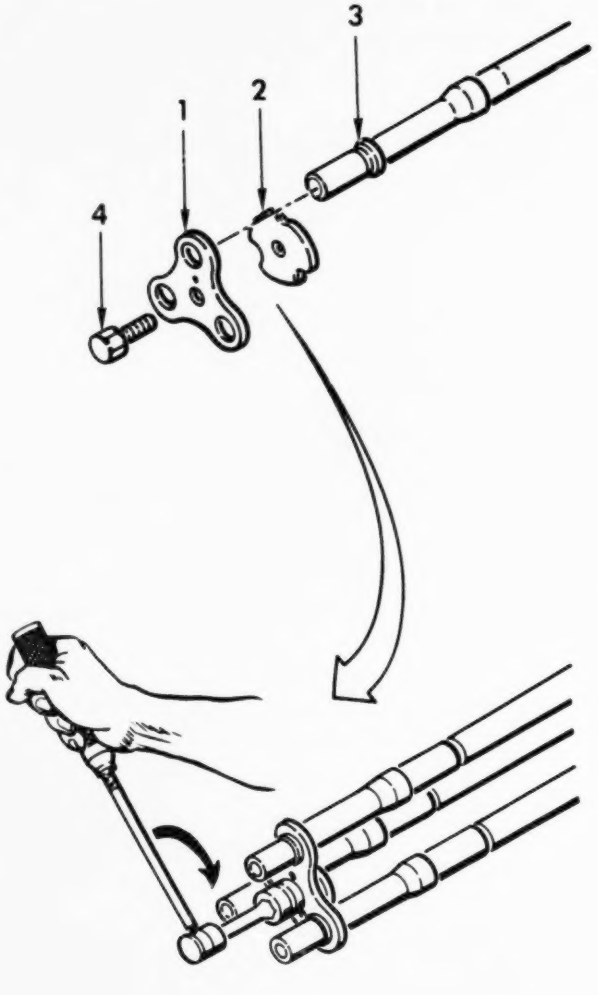


ASSEMBLY (cont)

CAUTION

A suitable device, such as a bar or a length of lumber (item 8, Appx D), should be placed directly behind muzzle clamp plate to prevent barrel cluster distortion.

65. INSTALL MUZZLE CLAMP PLATE (1).
    a. Place muzzle clamp plate (1) in position on barrels.
    b. Insert self-locking nut (2) between barrels.
    c. Hold self-locking nut (2) against collars (3), and thread bolt (4) into self-locking nut until a minimum of two threads protrude from end of self-locking nut.
    d. Restrain barrel cluster and, using a torque wrench, turn bolt slowly. If torque required to turn bolt is less than 90 lb-in. (10.2 N.m), replace bolt and self-locking nut.
    e. Torque bolt (4) to 63-79 lb-ft (85-107 N.m).



ARR82-25801

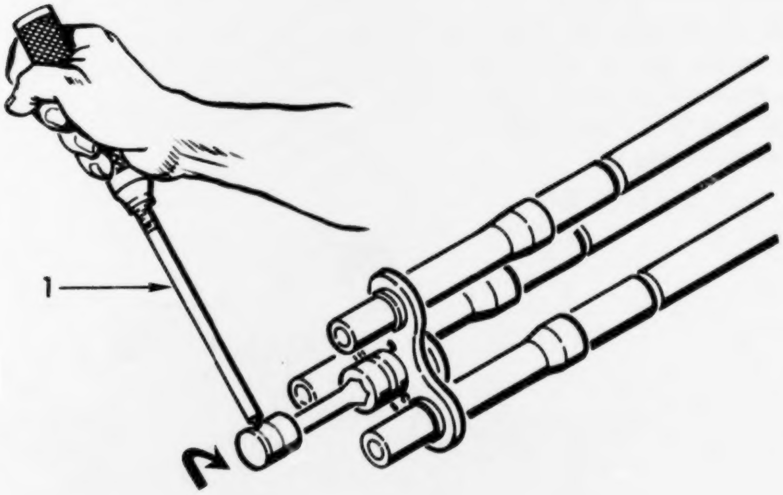
3-46. REPAIR OF M197 GUN (cont)

CHECKOUT

66. PERFORM GUN TORQUE CHECK.

    a. Place a torque wrench (1) on muzzle clamp bolt and rotate mechanism clockwise as viewed from barrel end. Observe average dynamic torque reading, not initial starting torque.

    b. Torque readings in excess of 100 lb-in (11.3 N.m) usually indicate worn parts, improper assembly, or lack of lubrication.



ARR82-25802

CHECKOUT (cont)

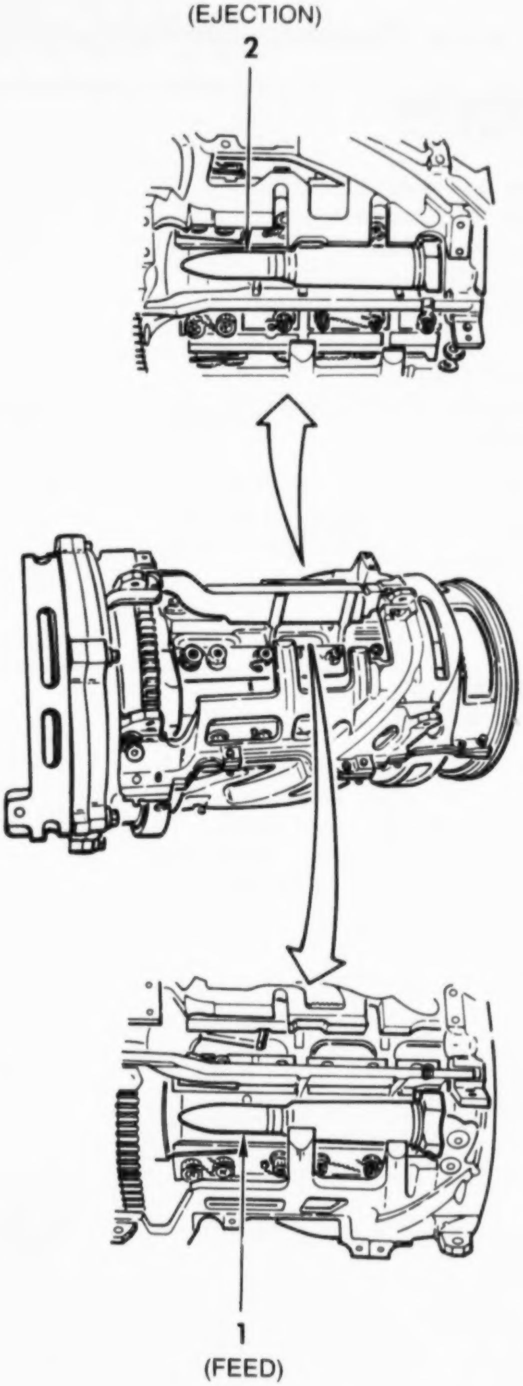
WARNING

Exercise extreme care when hand feeding dummy rounds. Support rounds very lightly with finger tips and do not place fingers between rounds and rotor in direction of rotation.

CAUTION

Exercise care when performing following steps making sure that dummy rounds do not enter M197 gun in front of extractor lips of breech bolts and jam gun. The jammed barrel will have to be removed to remove round.

67. PERFORM MECHANICAL CHECK.
    - a. Carefully reach in through opening on feeder side of guide bar and place a dummy round (1) in breech bolt, engaging rim of round in extractor lip. Turn gun slightly in firing direction until round is supported by rotor housing fingers. Withdraw hand before rotating M197 gun further.
    - b. Rotate mechanism. Dummy round should chamber, extract, and eject. No marks other than normal wear marks will appear on the ejected round. Hand feed three dummy rounds consecutively to fill all chambers. Rotate mechanism until all rounds have been ejected (2). Check all rounds for marks other than normal sliding wear.
    - c. Eliminate any malfunction by repair or replacement of defective part(s).



ARR82-25803

END OF TASK

3-47. REPAIR OF MID-BARREL CLAMP (cont)

DESCRIPTION

This task covers: Disassembly, cleaning, inspection, and assembly.

INITIAL SETUP

Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental

Personnel Required:
  68M Aircraft Weapon Systems
    Repairer

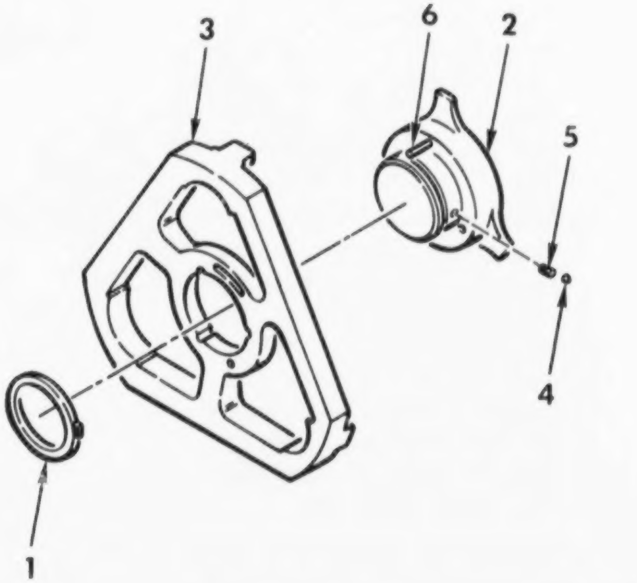
Equipment Conditions:
  Mid- Barrel clamp removed, see
    REPAIR OF M197 GUN,
    para 3-46.

DISASSEMBLY

NOTE

Detent plungers are small spring loaded parts. Make sure these parts will be confined during disassembly.

1. REMOVE RETAINING RING (1).
2. SEPARATE LOCKING DISK (2) FROM CLAMP PLATE (3) INSIDE A LARGE, CLEAN CONTAINER. THREE DETENT PLUNGERS (4) AND THREE SPRINGS (5) WILL FALL INTO CONTAINER.
3. IF DEFECTIVE, REMOVE SPRING PIN (6).



ARR82-25824

CLEANING

4. PERFORM GENERAL CLEANING PROCEDURES IN ACCORDANCE WITH SECTION IV.

INSPECTION

5. PERFORM GENERAL INSPECTION PROCEDURES IN ACCORDANCE WITH SECTION IV.

6. INSPECT PARTS IN ACCORDANCE WITH TABULATED DATA:

COMPONENT	POSSIBLE DEFECT	REMEDY
Clamp Plate	Bent or damaged locking lugs	Mid-barrel clamp is serviceable if it can be easily installed. Replace mid-barrel clamp if it cannot be easily installed.
	Distorted or cracked clamp plate or locking disk	Replace mid-barrel clamp.
Locking Disk	Missing spring pin	Replace spring pin.
	Missing retaining ring	Replace retaining ring.
	Missing locking lugs	Replace mid-barrel clamp.

3-47. REPAIR OF MID-BARREL CLAMP (cont)

ASSEMBLY

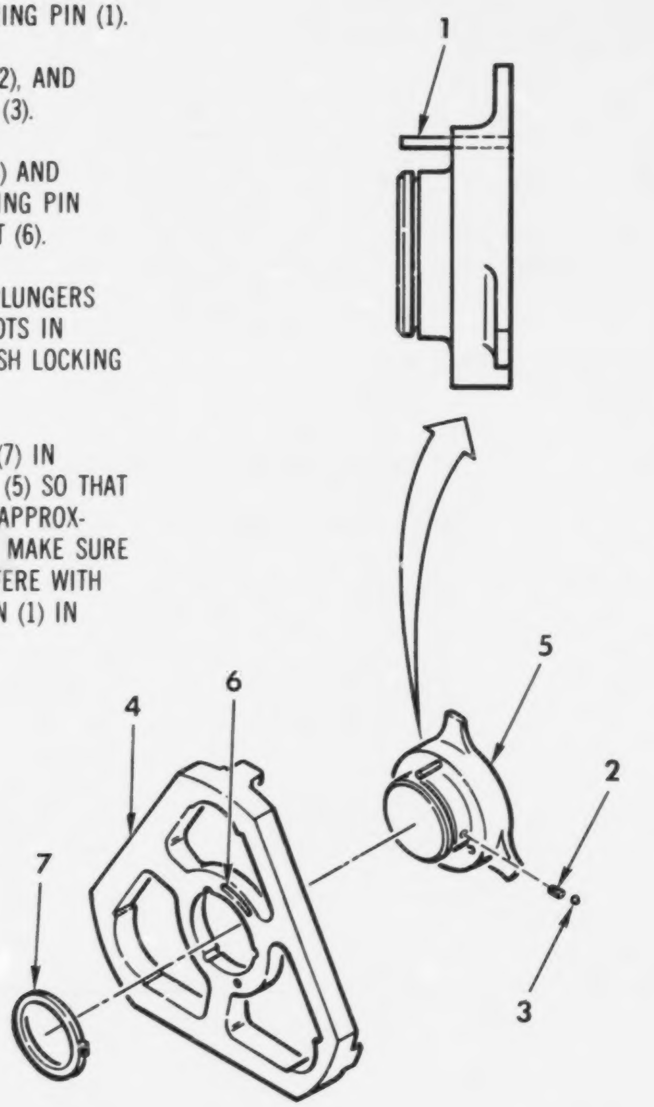
7. IF REMOVED, INSTALL SPRING PIN (1).

8. INSTALL THREE SPRINGS (2), AND THREE DETENT PLUNGERS (3).

9. POSITION CLAMP PLATE (4) AND LOCKING DISK (5) SO SPRING PIN (1) IS ALINED WITHIN SLOT (6).

10. DEPRESS THREE DETENT PLUNGERS (3), ALINE WITH THREE SLOTS IN CLAMP PLATE (4), AND PUSH LOCKING DISK (5) IN PLACE.

11. INSTALL RETAINING RING (7) IN GROOVE IN LOCKING DISK (5) SO THAT ENDS ARE PARALLEL AND APPROXIMATELY 1/8 INCH APART. MAKE SURE THAT TABS DO NOT INTERFERE WITH MOVEMENT OF SPRING PIN (1) IN SLOT (6).



ARR82-25825

END OF TASK

3-48. REPAIR OF FIRING CONTACT

DESCRIPTION

This task covers: Disassembly, cleaning, inspection, assembly, and checkout.

INITIAL SETUP

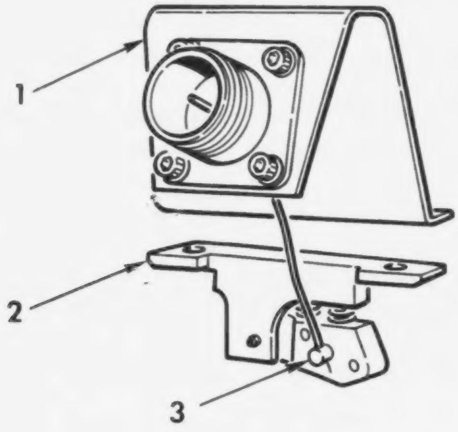
Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental
  Multimeter AN/USM-223

Personnel Required:
  68M Aircraft Weapon Systems
    Repairer

Equipment Conditions:
  Firing contact removed,
    see REPAIR OF M197 GUN,
    para 3-46.

DISASSEMBLY

1. SEPARATE CONNECTOR BRACKET (1) FROM FIRING CONTACT SUPPORT (2) BY SLIDING CONDUCTOR OUT OF INSERT (3).

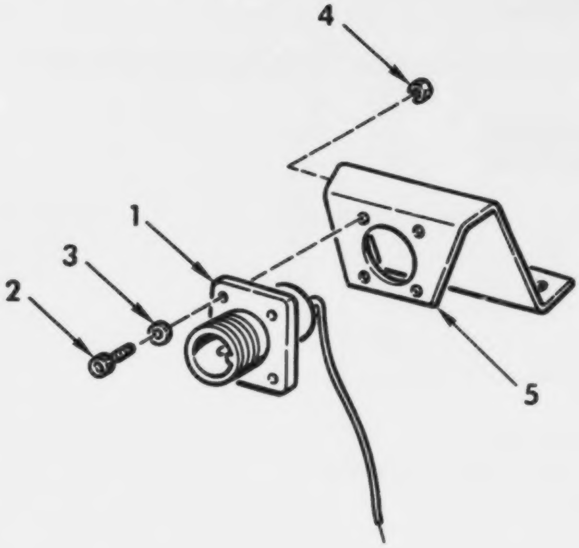


ARR82-27687

3-48. REPAIR OF FIRING CONTACT (cont)

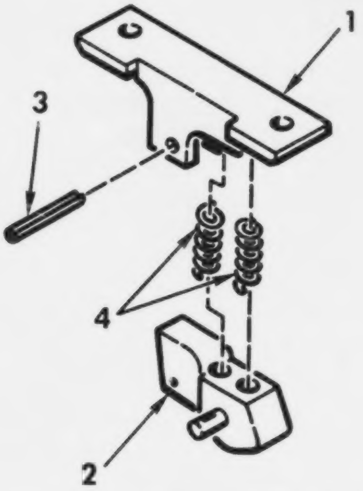
DISASSEMBLY (cont)

2. REMOVE CONNECTOR (1), FOUR SCREWS (2), FOUR WASHERS (3), FOUR NUTS (4), FROM CONNECTOR BRACKET (5).



ARR82-27688

3. SEPARATE FIRING CONTACT SUPPORT (1) FROM CONTACT CAM (2).
   a. Carefully remove spring pin (3).
   b. Remove firing contact support (1) and two springs (4) from contact cam (2).



ARR82-27689

CLEANING

4. PERFORM GENERAL CLEANING PROCEDURES IN ACCORDANCE WITH SECTION IV.

INSPECTION

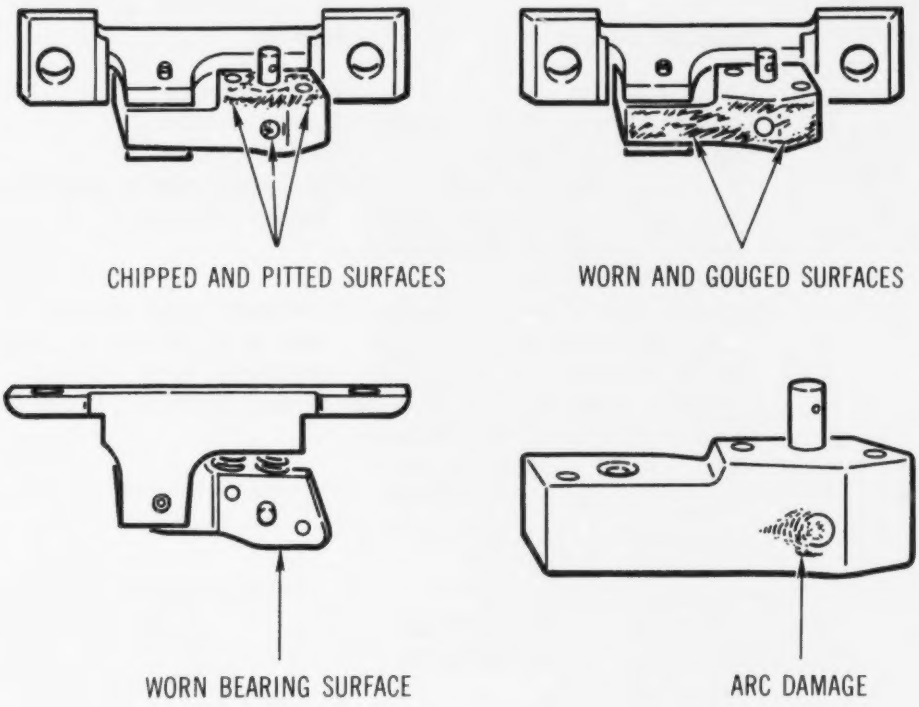
5. PERFORM GENERAL INSPECTION PROCEDURES IN ACCORDANCE WITH SECTION IV.

6. INSPECT PARTS IN ACCORDANCE WITH TABULATED DATA:

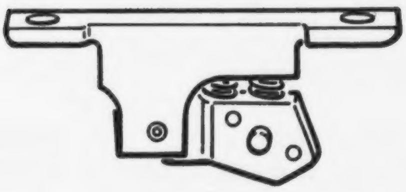
Component	**Possible Defect**	**Remedy**
Connector	Cracked connector	Replace connector.
	Cracked or broken potting compound	Replace connector.
	Broken or damaged conductor	Replace connector.
	Short circuit (continuity) between pin in connector and body of connector. Check with conductor removed from insert in contact cam.	Clean foreign material from connector. Replace connector.
	Open circuit (no continuity) between pin in connector and insert face on bottom of contact cam. Check that conductor is installed in insert in contact cam. If open circuit is obtained and conductor is installed in insert, remove conductor from insert; then, check for open circuit between pin in connector and bare end of conductor and for open circuit between insert inside of contact cam and contact on bottom of contact cam.	If necessary, install conductor in insert of contact cam. If connector is defective, replace connector. Replace contact cam if defective.
Firing Contact Support	Damaged or cracked firing contact support	Replace firing contact support.
	Elongated spring pin holes in contact cam mounting lugs on firing contact support. Acceptable hole diameter is 0.094 to 0.099 inch.	Replace firing contact support.
	Bent contact cam mounting lugs on firing contact support. Acceptable width between mounting lugs is 0.310 to 0.318 inch.	Bend to dimension. Replace if functionally impaired.
Contact Cam	Loose insert in contact cam	Replace contact cam.
	Excessive wear or damage to bottom of contact cam	Replace contact cam.
	Elongated spring pin hole in contact cam	Replace contact cam.
Springs	Broken or weak contact cam springs	Replace contact cam springs.

3-48. REPAIR OF FIRING CONTACT (cont)

INSPECTION (cont)


CHIPPED AND PITTED SURFACES
WORN AND GOUGED SURFACES
WORN BEARING SURFACE
ARC DAMAGE

UNSERVICEABLE

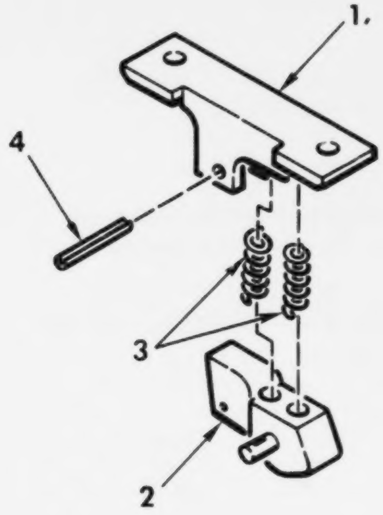


NEW

ARR82-27690

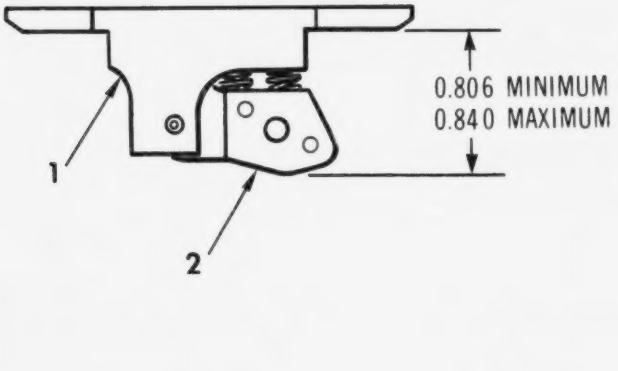
ASSEMBLY

7. JOIN FIRING CONTACT SUPPORT (1) TO CONTACT CAM (2).
   - a. Install two springs (3).
   - b. Aline hole in firing contact support (1) and contact cam (2).
   - c. Install spring pin (4).



ARR82-27691

8. MEASURE DISTANCE BETWEEN FIRING CONTACT SUPPORT (1) AND CONTACT CAM (2).


0.806 MINIMUM
0.840 MAXIMUM
1
2

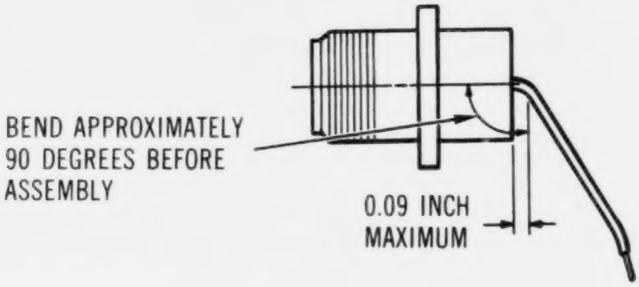
ARR82-27692

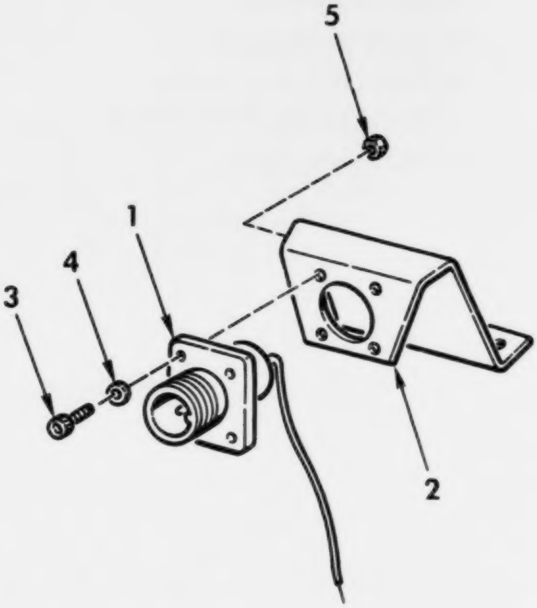
3-48. REPAIR OF FIRING CONTACT (cont)

ASSEMBLY (cont)

9. PREPARE CONNECTOR CONDUCTOR WIRE FOR INSTALLATION.

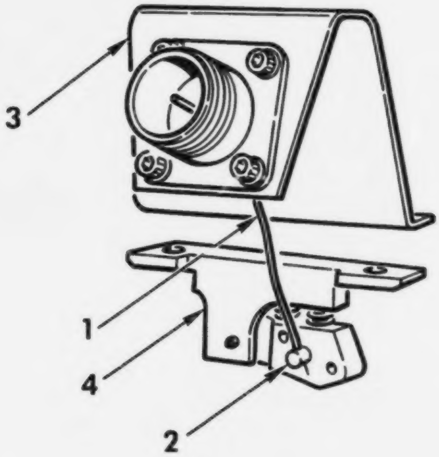
10. INSTALL CONNECTOR (1).
    a. Using caution, carefully install connector (1) to connector bracket (2).
    b. Secure connector (1) using four screws (3), four washers (4), and four nuts (5).


BEND APPROXIMATELY
90 DEGREES BEFORE
ASSEMBLY
0.09 INCH
MAXIMUM



ARR82-27693

11. INSTALL CONDUCTOR WIRE (1).
    a. Push bare end of conductor wire (1) through hole in insert (2).
    b. Join connector bracket (3) and firing contact support (4).

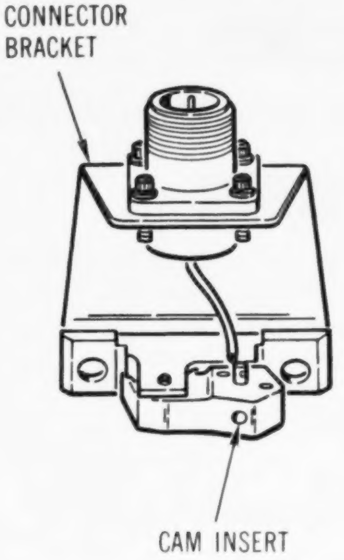


ARR82-27694

CHECKOUT

12. PERFORM SHORT CIRCUIT CHECK.

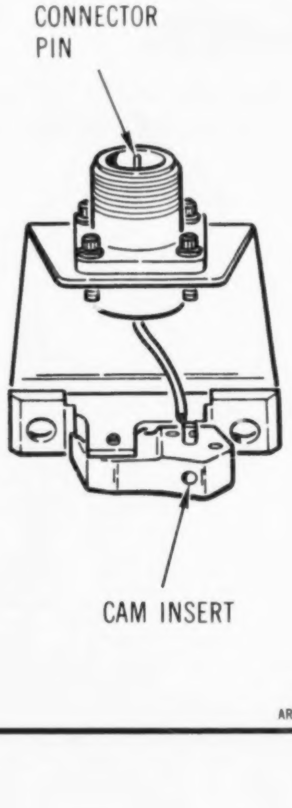
Check for short circuit between connector bracket and cam insert.


CONNECTOR BRACKET
CAM INSERT

ARR82-27695

13. PERFORM CONTINUITY CHECK.

Check for continuity between connector pin and cam insert.


CONNECTOR PIN
CAM INSERT

ARR82-27696

END OF TASK

3-49. REPAIR OF BREECH BOLT (11691422)

DESCRIPTION

This task covers: Disassembly, cleaning, inspection, assembly, and checkout.

INITIAL SETUP

Tools/Test and Support Equipment:
Tool Set, A/C Armament Repairman: Basic
Tool Set, A/C Armament Repairman: Supplemental
Multimeter AN/USM-223

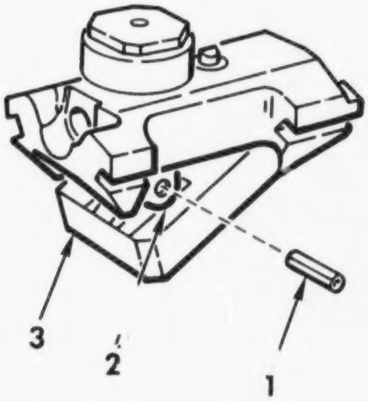
Materials:
Lubricant (Item 6, Appx D)

Personnel Required:
68M Aircraft Weapon Systems Repairer

Equipment Conditions:
Breech bolt removed, see REPAIR OF M197 GUN, para 3-46.

DISASSEMBLY

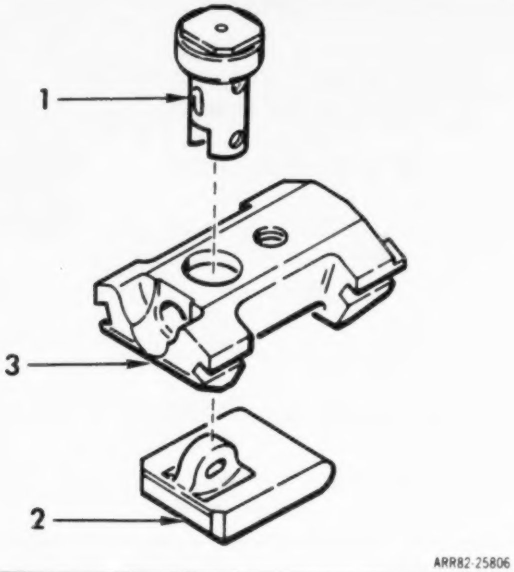
1. REMOVE SPRING PIN (1), SECURING BOLT SHAFT (2) TO LOCKING BLOCK (3).



ARR82-25805

DISASSEMBLY (cont)

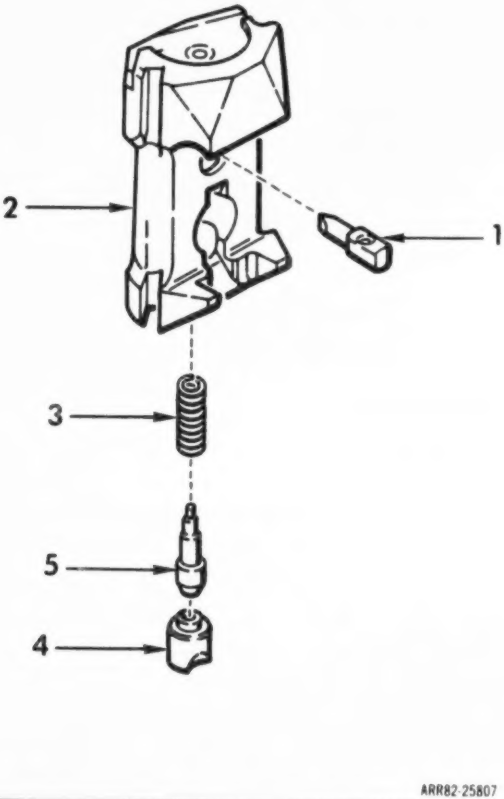
2. SEPARATE BOLT SHAFT ASSEMBLY (1) AND LOCKING BLOCK (2) FROM BREECH BOLT BODY (3).



WARNING

When removing firing cam pin firing pin may be propelled from breech bolt body with sufficient force to cause injury to personnel. Hold aft face of breech bolt body on working surface so firing pin will be retained within breech bolt body.

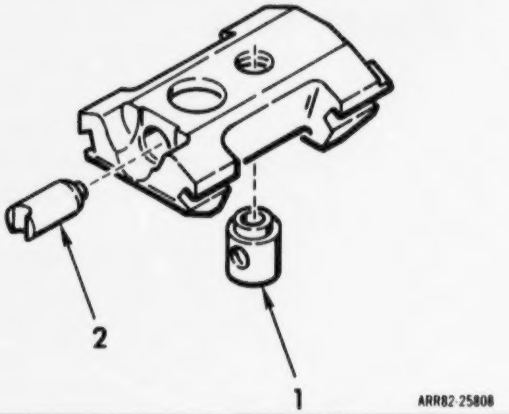
3. REMOVE FIRING CAM PIN (1).
   a. Using a pin punch, push firing cam pin (1) out of breech bolt body (2).
   b. Remove pin punch, firing pin spring (3), contact stop (4), and firing pin (5).



3-49. REPAIR OF BREECH BLOCK (11691422) (cont)

DISASSEMBLY (cont)

4. REMOVE FIRING CAM PIN INSULATOR (1), AND FIRING PIN INSULATOR (2).



CLEANING

5. PERFORM GENERAL CLEANING PROCEDURES IN ACCORDANCE WITH SECTION IV.

INSPECTION

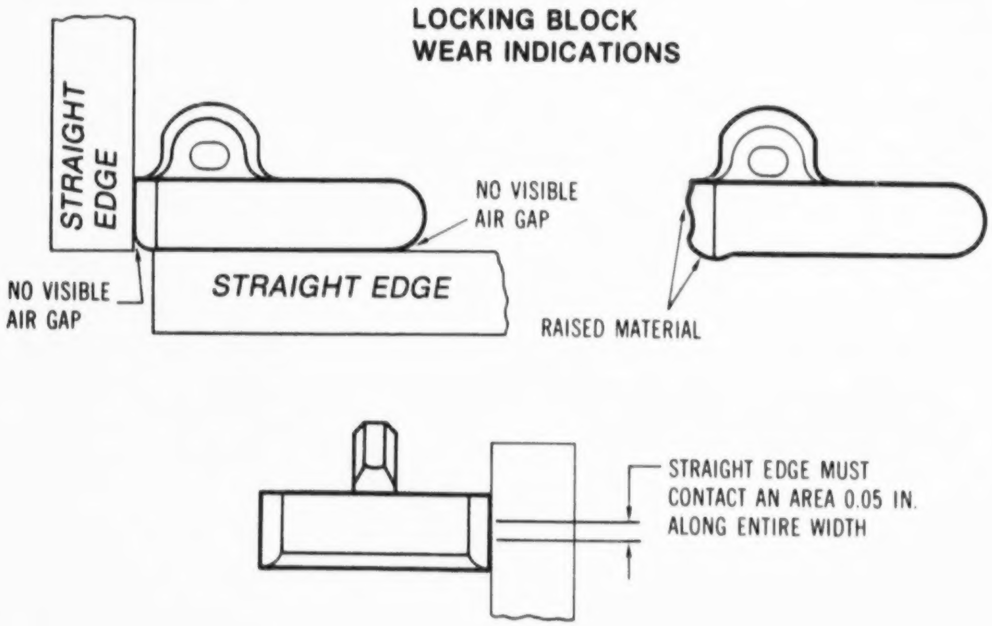
6. PERFORM GENERAL INSPECTION PROCEDURES IN ACCORDANCE WITH SECTION IV.

7. INSPECT PARTS IN ACCORDANCE WITH TABULATED DATA:

Component	Possible Defect	Remedy
Bolt Shaft	Shaft roller damaged, does not rotate freely	Replace bolt shaft assembly.
	Burred bolt shaft	Remove burrs.
	Bent or galled bolt shaft	Replace bolt shaft assembly.
	Cracked or spread bolt shaft forks	Replace bolt shaft assembly.
Locking Block	Burred lug	Remove burrs.
	Cracked lug	Replace locking block.
Firing Pin	Peened over tip, bent, cracked, or broken	Replace firing pin.

INSPECTION (cont)

Component	Possible Defect	Remedy
Firing Pin Insulator	Deformed or cracked	Replace firing pin insulator.
Firing Pin Spring	Kinked or broken	Replace firing pin spring.
Contact stop	Cracked or deformed insulation	Replace contact stop.
	Deformed contact stop	Replace contact stop.
	Missing small projection	Replace contact stop.
Firing Cam Pin	Chipped, galled or bent	Replace firing cam pin.
Firing Cam Pin Insulator	Deformed or cracked	Replace firing cam pin insulator.
Breech Bolt Body	Elongated or galled holes	Replace breech bolt body.
	Burred holes	Remove burrs.
	Chipped, cracked, or gouged extractor lip	Replace breech bolt body.
	Burred extractor lip	Remove burrs.


LOCKING BLOCK WEAR INDICATIONS

STRAIGHT EDGE
NO VISIBLE AIR GAP
STRAIGHT EDGE
NO VISIBLE AIR GAP
RAISED MATERIAL
STRAIGHT EDGE MUST CONTACT AN AREA 0.05 IN. ALONG ENTIRE WIDTH

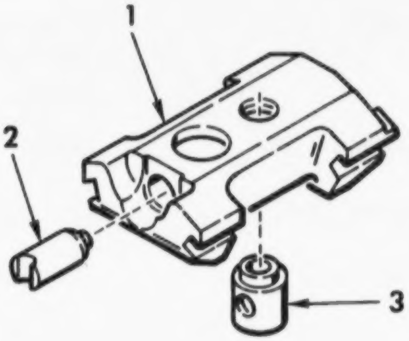
ARR82-26009 A

3-49. REPAIR OF BREECH BLOCK (11691422) (cont)

ASSEMBLY

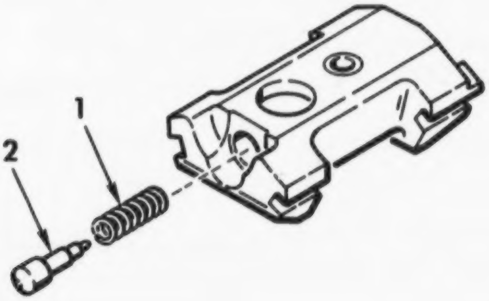
8. LUBRICATE BREECH BOLT BODY (1) WITH LUBRICANT.

9. INSTALL FIRING PIN INSULATOR (2), AND CAM PIN INSULATOR (3).



ARR82-25809

10. INSTALL FIRING PIN SPRING (1) AND FIRING PIN (2).



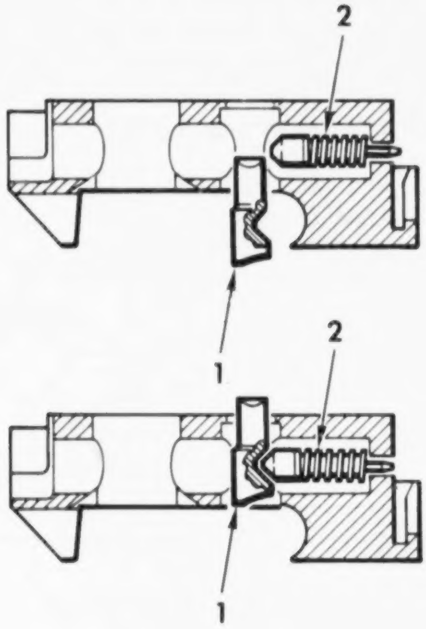
ARR82-25810

ASSEMBLY (cont)

WARNING

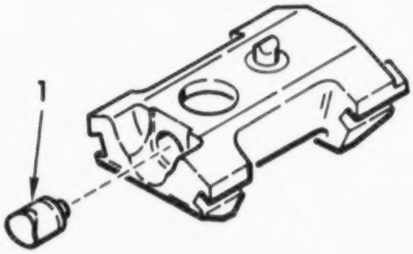
Exercise care when performing following step. Firing pin may be propelled from breech bolt body with sufficient force to cause injury.

11. INSTALL FIRING CAM PIN (1).
    a. Using a pin punch, hold firing pin (2) forward.
    b. Push up on firing cam pin (1), and while slowly withdrawing pin punch, engage aft end of firing pin in countersunk hole.



ARR82-25811

12. INSTALL CONTACT STOP (1) AND SEAT FLUSH WITH CUTOUT.



ARR82-25812

3-49. REPAIR OF BREECH BLOCK (11691422) (cont)

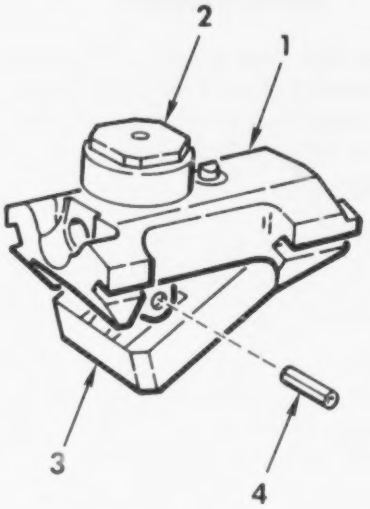
ASSEMBLY (cont)

CAUTION

Make sure that spring pin is a drive fit. If spring pin hole is oversize and/or spring pin is undersize, spring pin could vibrate out of bolt shaft during firing and cause a gun jam.

13. INSERT BOLT SHAFT ASSEMBLY (1) THROUGH BREECH BOLT BODY (2), AND PLACE LOCKING BLOCK (3) IN POSITION ON BREECH BOLT BODY.

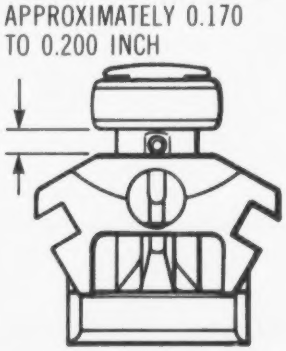
14. INSTALL SPRING PIN (4).

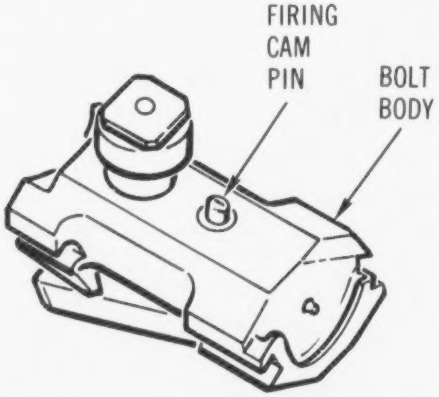


ARR82-25813

CHECKOUT

15. PERFORM SHORT CIRCUIT CHECK.
    a. Insert a nonconductive material to insulate firing cam pin from contacting locking block.
    b. Press firing cam pin and check for short circuit between firing cam pin and bolt body.

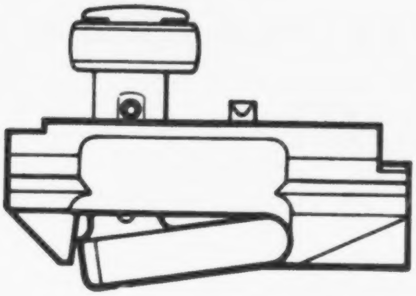


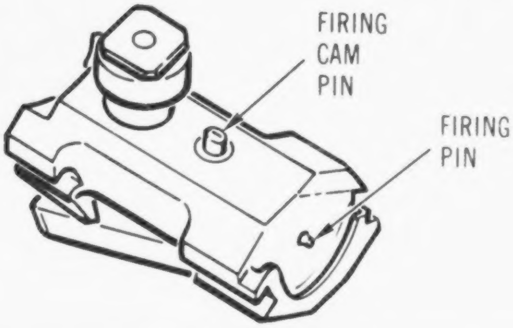


ARR82-25848

CHECKOUT (cont)

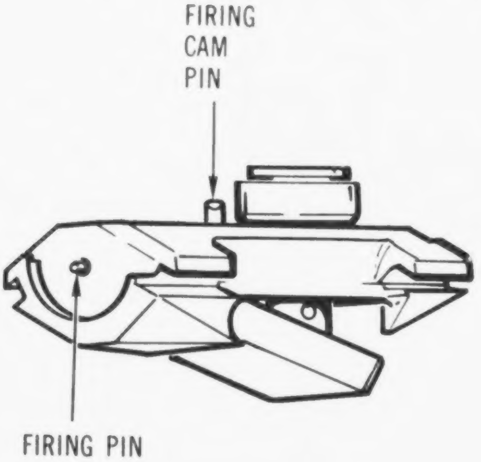
16. PERFORM CONTINUITY CHECK.
    a. Insert a nonconductive material to insulate firing cam pin from contacting locking block.
    b. Press firing cam pin and check for continuity between firing cam pin and firing pin.




FIRING
CAM
PIN
FIRING
PIN

ARR82-25849

17. PERFORM FIRING PIN PROTRUSION CHECK.
    a. Press firing cam pin and check for firing pin protrusion.
    b. If firing pin does not protrude, disassemble and reassemble as necessary.


FIRING
CAM
PIN
FIRING PIN

ARR82-25850

END OF TASK

3-50. REPAIR OF BREECH BOLT (11010157)

DESCRIPTION

This task covers: Disassembly, cleaning, inspection, assembly, and checkout.

INITIAL SETUP

Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental
  Multimeter AN/USM-223

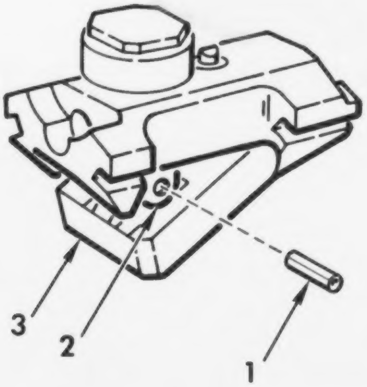
Materials:
  Lubricant (Item 6, Appx D)

Personnel Required:
  68M Aircraft Weapon Systems
    Repairer

Equipment Conditions:
  Breech bolt removed, see
    REPAIR OF M197 GUN,
    para 3-46.

DISASSEMBLY

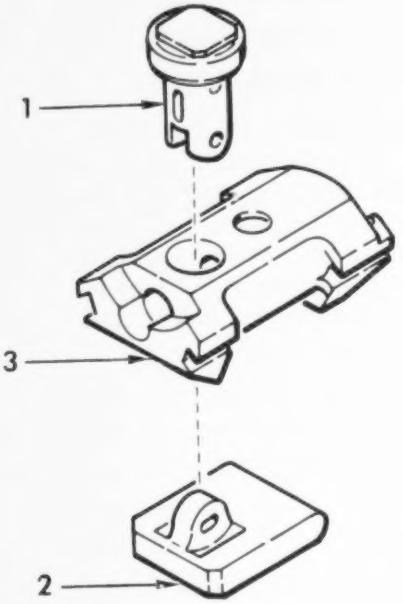
1. REMOVE SPRING PIN (1), SECURING BOLT SHAFT (2) TO LOCKING BLOCK (3).



ARR82-25814

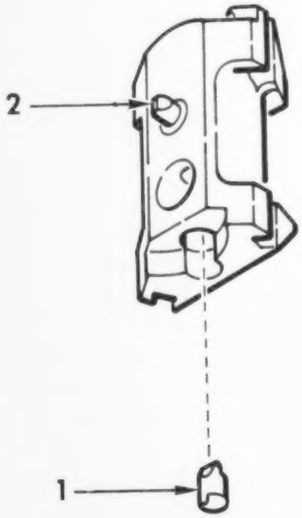
DISASSEMBLY (cont)

2. SEPARATE BOLT SHAFT ASSEMBLY (1), AND LOCKING BLOCK (2) FROM BREECH BOLT BODY (3).



ARR82 25815

3. REMOVE CONTACT STOP (1) BY PRESSING TOP OF FIRING CAM PIN (2).



ARR82 25816

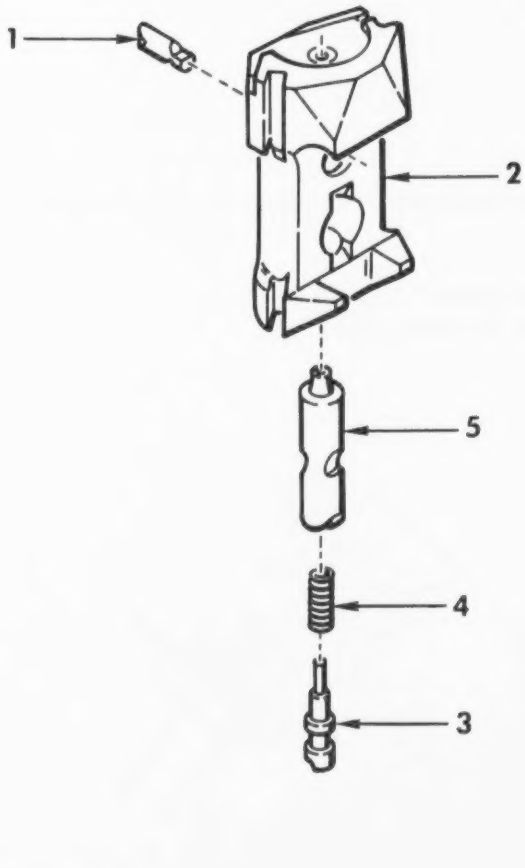
3-50. REPAIR OF BREECH BLOCK (11010157) (cont)

DISASSEMBLY (cont)

WARNING

When removing firing cam pin firing pin may be propelled from breech bolt body with sufficient force to cause injury to personnel. Hold aft face of breech bolt body on working surface so firing pin will be retained within breech bolt body.

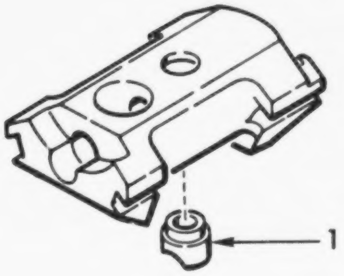
4. REMOVE FIRING CAM PIN (1), FIRING PIN (3), FIRING PIN SPRING (4), AND FIRING PIN INSULATOR (5).
   a. Using a pin punch, push firing cam pin (1) out of breech bolt body (2).
   b. As pin punch is withdrawn, firing pin (3) will be ejected from firing pin insulator or in breech bolt body (2).
   c. Tap aft face of breech bolt body (2) to dislodge firing pin spring (4) and firing pin insulator (5).



ARR82-25817

DISASSEMBLY (cont)

5. REMOVE FIRING CAM PIN INSULATOR (1).



ARR82-25818

CLEANING

6. PERFORM GENERAL CLEANING PROCEDURES IN ACCORDANCE WITH SECTION IV.

INSPECTION

7. PERFORM GENERAL INSPECTION PROCEDURES IN ACCORDANCE WITH SECTION IV.

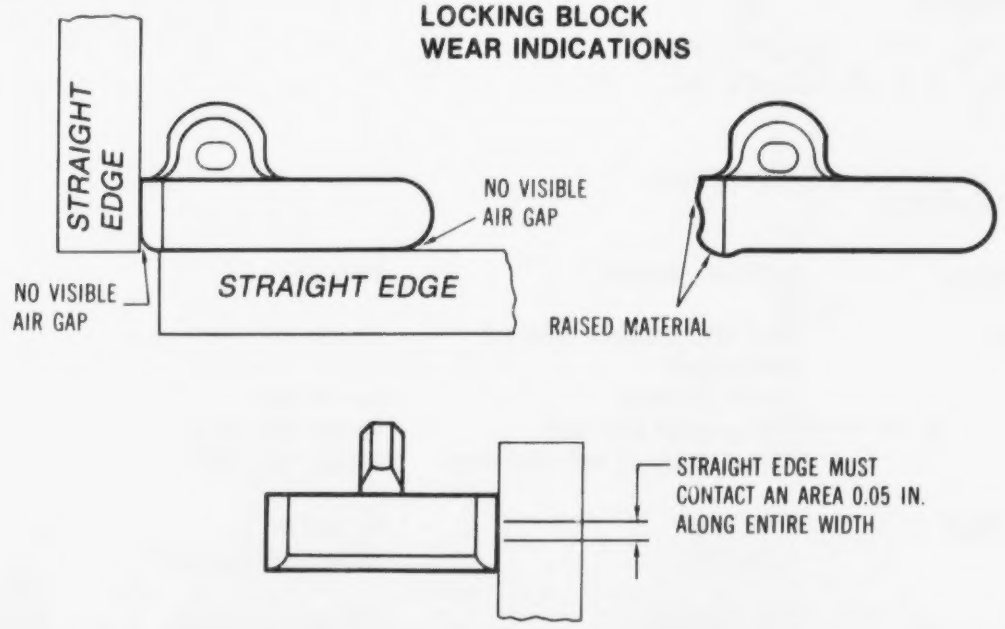
8. INSPECT PARTS IN ACCORDANCE WITH TABULATED DATA:

Component	**Possible Defect**	**Remedy**
Bolt Shaft	Shaft roller damaged, does not rotate freely	Replace bolt shaft.
	Burred bolt shaft	Remove burrs.
	Bent or galled bolt shaft	Replace bolt shaft.
	Cracked or spread bolt shaft forks	Replace bolt shaft.
Locking Block	Burred lug	Remove burrs.
	Cracked lug	Replace locking block.
	Wear indication	Rebuild breech bolt.

3-50. REPAIR OF BREECH BLOCK (11010157) (cont)

INSPECTION (cont)

Component	Possible Defect	Remedy
Firing Pin	Peened over tip, bent, cracked, or broken	Replace firing pin.
Firing Pin Insulator	Deformed or cracked	Replace firing pin insulator.
Firing Pin Spring	Kinked or broken	Replace firing pin spring.
Contact Stop	Cracked or deformed insulation	Replace contact stop.
	Deformed contact stop	Replace contact stop.
	Missing small projection	Replace contact stop.
Firing Cam Pin	Chipped, galled or bent	Replace firing cam pin.
Firing Cam Pin Insulator	Deformed or cracked	Replace firing cam pin insulator.
Breech Bolt Body	Elongated or galled holes	Replace breech bolt body.
	Burred holes	Remove burrs.
	Chipped, cracked, or gouged extractor lip	Replace breech bolt body.
	Burred extractor lip	Remove burrs.

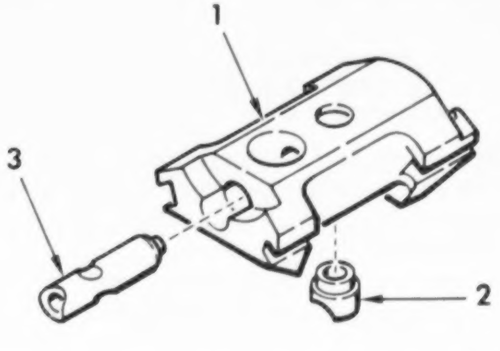


LOCKING BLOCK WEAR INDICATIONS

STRAIGHT EDGE
NO VISIBLE AIR GAP
STRAIGHT EDGE
NO VISIBLE AIR GAP
RAISED MATERIAL
STRAIGHT EDGE MUST CONTACT AN AREA 0.05 IN. ALONG ENTIRE WIDTH
ARR82-26010A

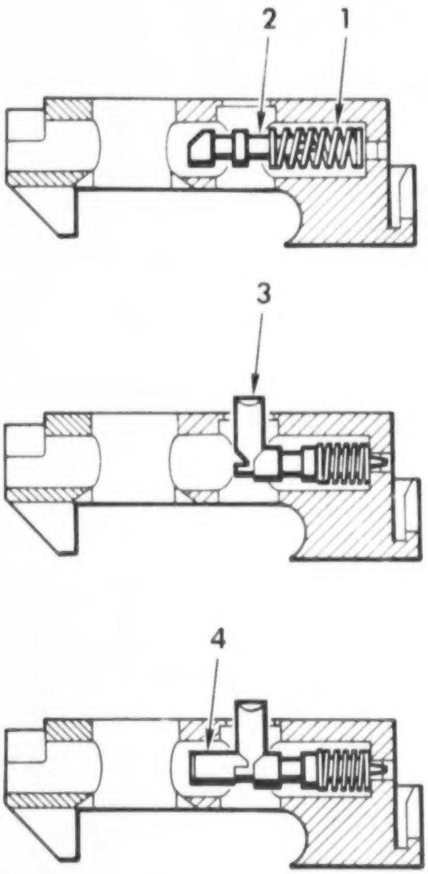
ASSEMBLY

9. LUBRICATE BREECH BOLT BODY (1) WITH LUBRICANT.
10. INSTALL FIRING CAM PIN INSULATOR (2) AND FIRING PIN INSULATOR (3).



ARR82-25819

11. INSTALL FIRING PIN SPRING (1) AND FIRING PIN (2).
12. INSTALL FIRING CAM PIN (3).
    a. Using a pin punch, hold firing pin (2) forward.
    b. Orient firing cam pin (3), with "V" notch toward rear of breech bolt body.
    c. Install and hold down firing cam pin (3). Slowly withdraw pin punch to engage bevel on aft end of firing pin (2) with bevel on firing cam pin.
    d. Hold firing cam pin (3) in place.
13. INSTALL CONTACT STOP (4) AND PUSH FORWARD UNTIL IT ENGAGES FIRING CAM PIN (3).
14. SLOWLY RELEASE PRESSURE ON FIRING CAM PIN (3).
15. IF FIRING CAM PIN (3) IS NOT RETAINED, GO TO STEP 12.



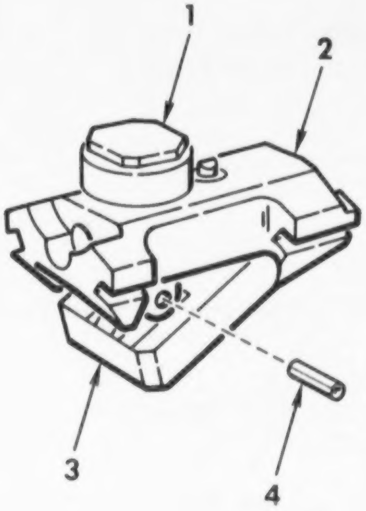
ARR82-25820

3-50. REPAIR OF BREECH BLOCK (11010157) (cont)

ASSEMBLY (cont)

CAUTION

Make sure that spring pin is a drive fit. If spring pin hole is oversize and/or spring pin is undersize, spring pin could vibrate out of bolt shaft during firing and cause an M197 gun jam.



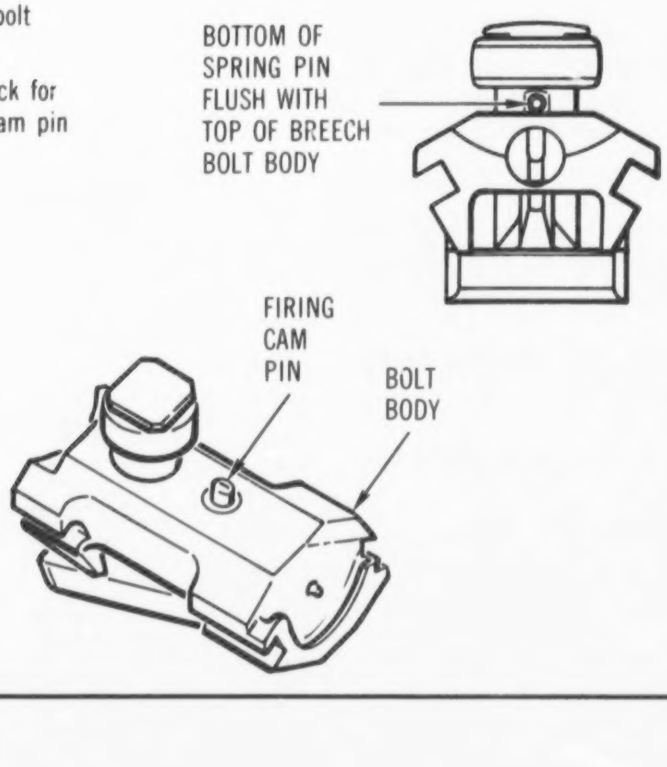
16. INSERT BOLT SHAFT ASSEMBLY (1) THROUGH BREECH BOLT BODY (2), AND PLACE LOCKING BLOCK (3) IN POSITION ON BREECH BOLT BODY.

17. INSTALL SPRING PIN (4).

ARR82-25821

CHECKOUT

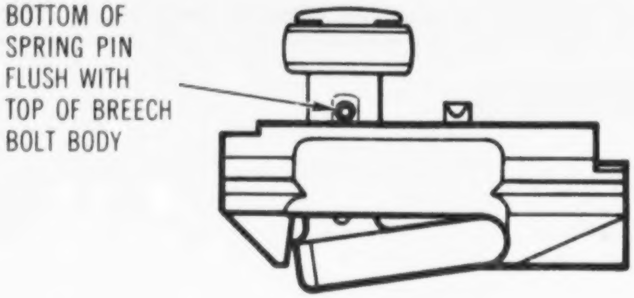
18. PERFORM SHORT CIRCUIT CHECK.
    a. Orient breech bolt and hold bolt shaft in position.
    b. Press firing cam pin and check for short circuit between firing cam pin and bolt body.

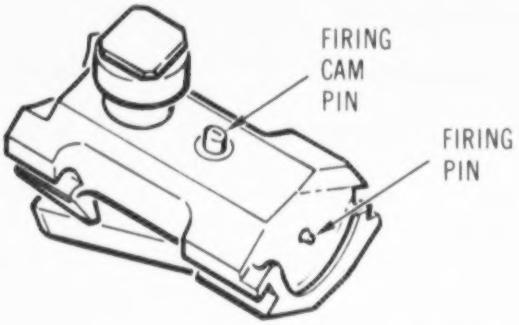

BOTTOM OF SPRING PIN FLUSH WITH TOP OF BREECH BOLT BODY
FIRING CAM PIN
BOLT BODY

ARR82-25845

CHECKOUT (cont)

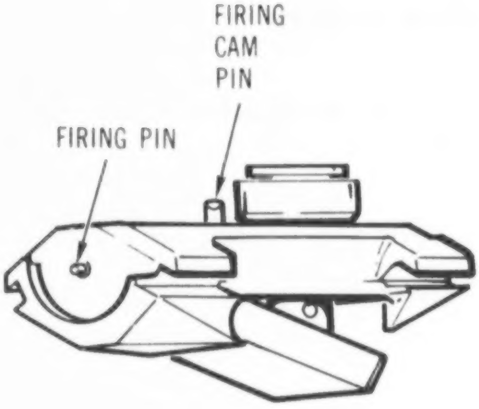
19. PERFORM CONTINUITY CHECK.
    a. Orient breech bolt and hold bolt shaft in position.
    b. Press firing cam pin and check for continuity between firing cam pin and firing pin.


BOTTOM OF
SPRING PIN
FLUSH WITH
TOP OF BREECH
BOLT BODY


FIRING
CAM
PIN
FIRING
PIN

ARR82 25846

20. PERFORM FIRING PIN PROTRUSION CHECK.
    a. Press firing cam pin and check for firing pin protrusion.
    b. If firing pin does not protrude, disassemble and reassemble as necessary.


FIRING
CAM
PIN
FIRING PIN

ARR82 25847

END OF TASK

3-51. REPAIR OF INDEX PIN

DESCRIPTION

This task covers: Disassembly, cleaning, inspection, and assembly.

INITIAL SETUP

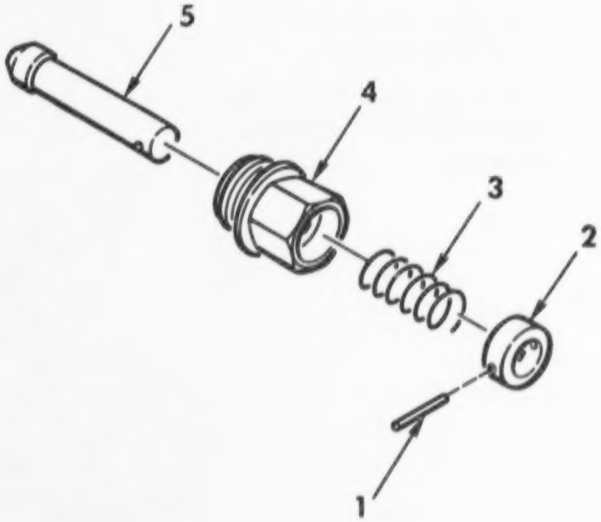
Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental

Personnel Required:
  68M Aircraft Weapon Systems
    Repairer

Equipment Conditions:
  Index pin removed, see
    REPAIR OF M197 GUN,
    para 3-46.

DISASSEMBLY

1. REMOVE SPRING PIN (1) AND KNOB (2).
2. REMOVE SPRING (3) AND BUSHING NUT (4) FROM PIN (5).



ARR82-25822

CLEANING

3. PERFORM GENERAL CLEANING PROCEDURES IN ACCORDANCE WITH SECTION IV.

INSPECTION

4. PERFORM GENERAL INSPECTION PROCEDURES IN ACCORDANCE WITH SECTION IV.

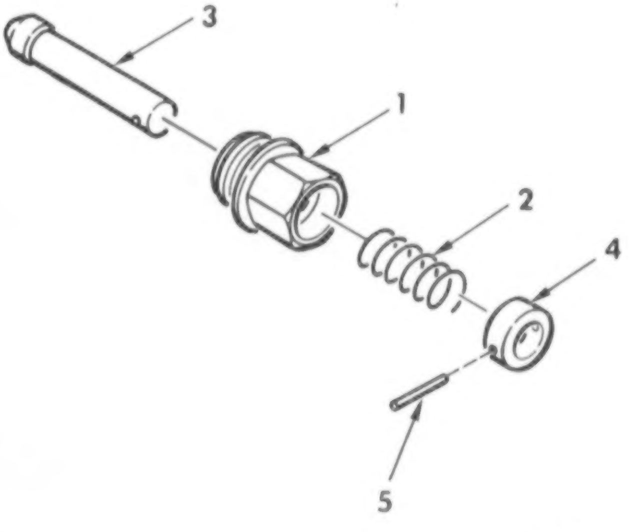
5. INSPECT PARTS IN ACCORDANCE WITH TABULATED DATA:

Component	Possible Defect	Remedy
Pin	Damaged or bent	Replace.
Spring	Damaged or broken	Replace.
Bushing Nut	Damaged or broken	Replace index pin.
Knob	Damaged or broken	Replace index pin.

ASSEMBLY

6. INSTALL BUSHING NUT (1) AND SPRING (2) ON PIN (3).

7. INSTALL KNOB (4) ON PIN (3), AND SECURE WITH SPRING PIN (5).



END OF TASK

3-52. INSTALLATION OF M197 GUN

DESCRIPTION

This task covers: Installation.

INITIAL SETUP

Tools/Test and Support Equipment:
- Tool Set, A/C Armament Repairman: Basic
- Tool Set, A/C Armament Repairman: Supplemental
- Gun Lifting Sling (Fig E-2, Appx E)
- Gun Handling Adapter

Materials:
- Grease (Item 3, Appx D)
- Lockwire (Item 4, Appx D)
- Lockwire (Item 5, Appx D)

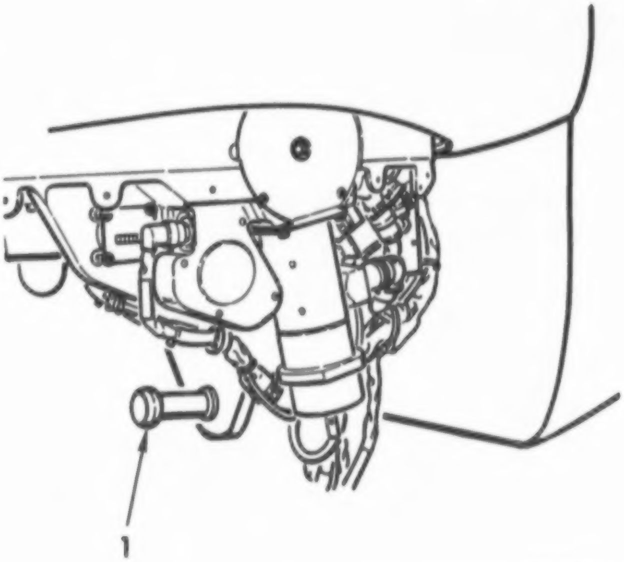
Personnel Required:
- 68M Aircraft Weapon Systems Repairer (3)

Equipment Conditions:
- HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SET-UP performed, para 2-6.

INSTALLATION

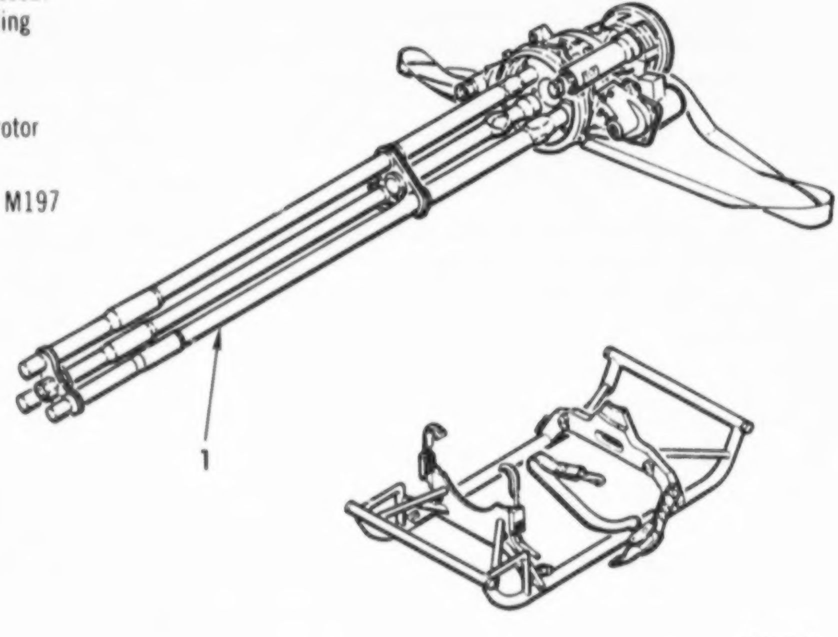
1. RELEASE ELEVATION DRIVE MOTOR BRAKE AND POSITION SADDLE TO APPROXIMATELY LEVEL POSITION. APPLY ELEVATION DRIVE MOTOR BRAKE.

2. LUBRICATE REAR BALL MOUNT (1) WITH GREASE.



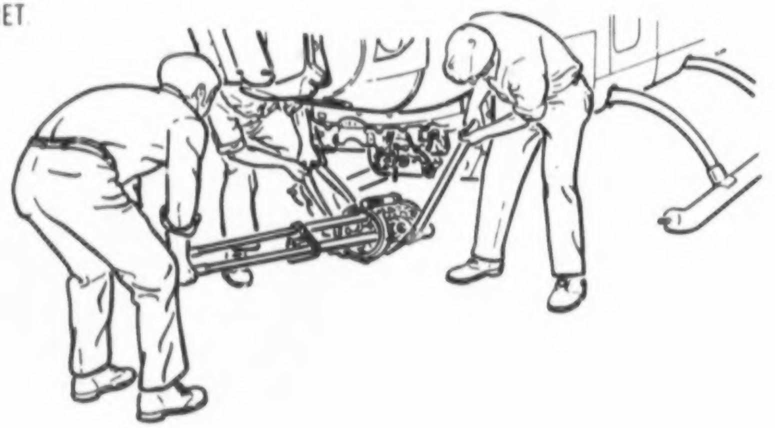
INSTALLATION (cont)

3. REMOVE M197 GUN (1) FROM GUN HANDLING ADAPTER.
   a. Position gun handling adapter next to turret.
   b. Remove hold down devices securing M197 gun to gun handling adapter.
   c. Position gun lifting sling, with center support under rotor housing.
   d. With three persons, remove M197 gun.



ARR82-27659

4. POSITION M197 GUN UNDER TURRET.



ARR82-27660

3-52. INSTALLATION OF M197 GUN (cont)

INSTALLATION (cont)

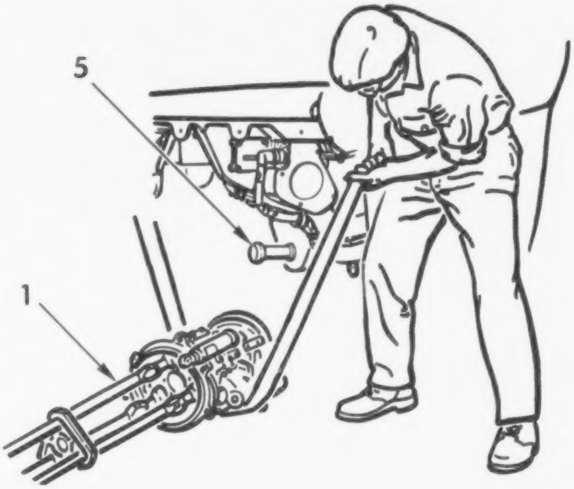
WARNING

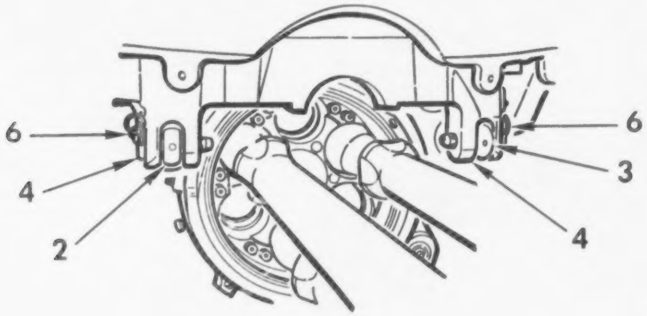
Keep fingers clear of rotor, breech bolts, and other movable parts to avoid injury to fingers if barrel cluster is accidentally rotated.

CAUTION

Install quick-release pin in recoil adapter first and then in slider assembly.

5. INSTALL M197 GUN (1).
   - a. Rotate recoil adapter shaft (2) and slider shaft (3) to match openings in saddle lugs (4).
   - b. Using three persons, raise M197 gun and slide M197 gun onto rear ball mount (5).
   - c. Engage recoil adapter shaft (2) and slider shaft (3) in saddle lugs (4).
   - d. Secure M197 gun in place using two quick-release pins (6).

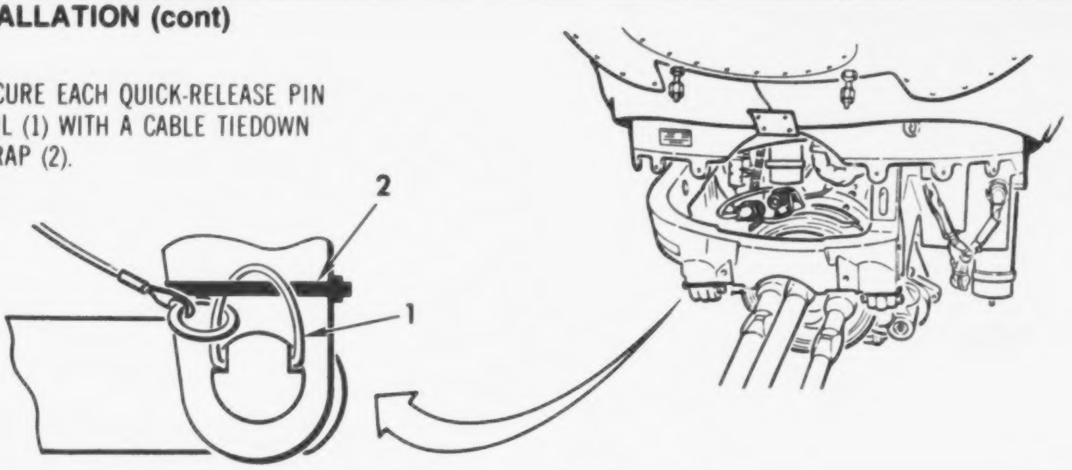




ARR82-27662

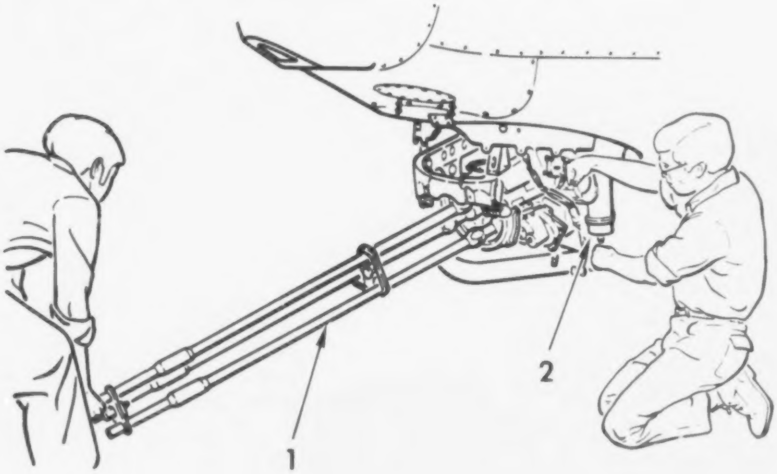
INSTALLATION (cont)

6. SECURE EACH QUICK-RELEASE PIN BAIL (1) WITH A CABLE TIEDOWN STRAP (2).



ARR82 27663

7. LOWER BARREL CLUSTER (1) TO FLOOR.
   a. Position two persons, one at barrel end and one at elevation drive motor (2).
   b. Release elevation drive motor (2) brake and carefully lower barrel cluster (1) to floor.



ARR82 27664

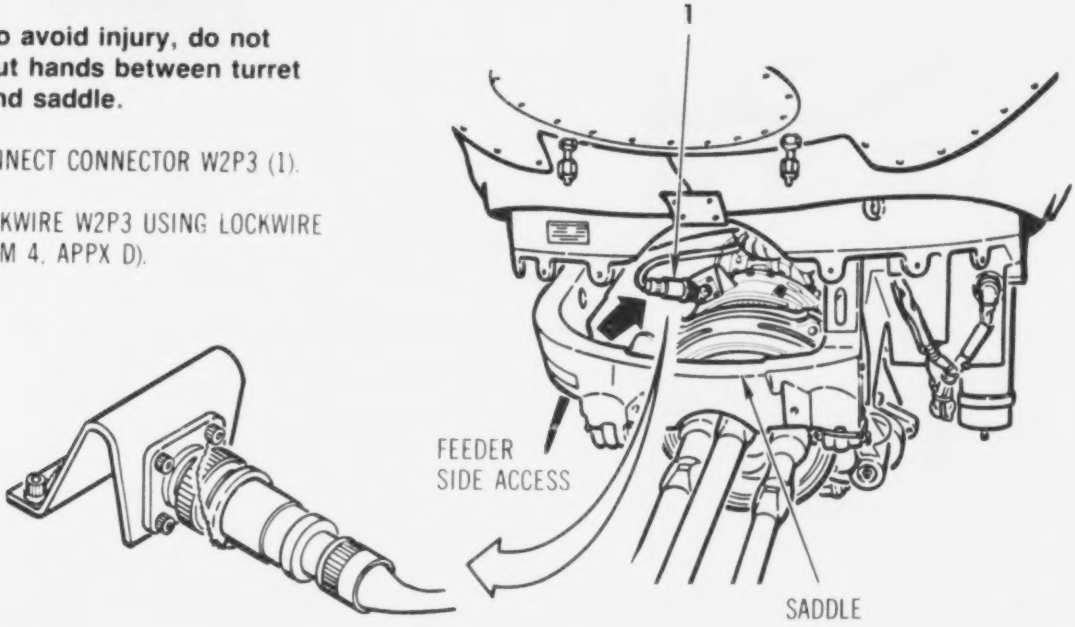
3-52. INSTALLATION OF M197 GUN (cont)

INSTALLATION (cont)

WARNING

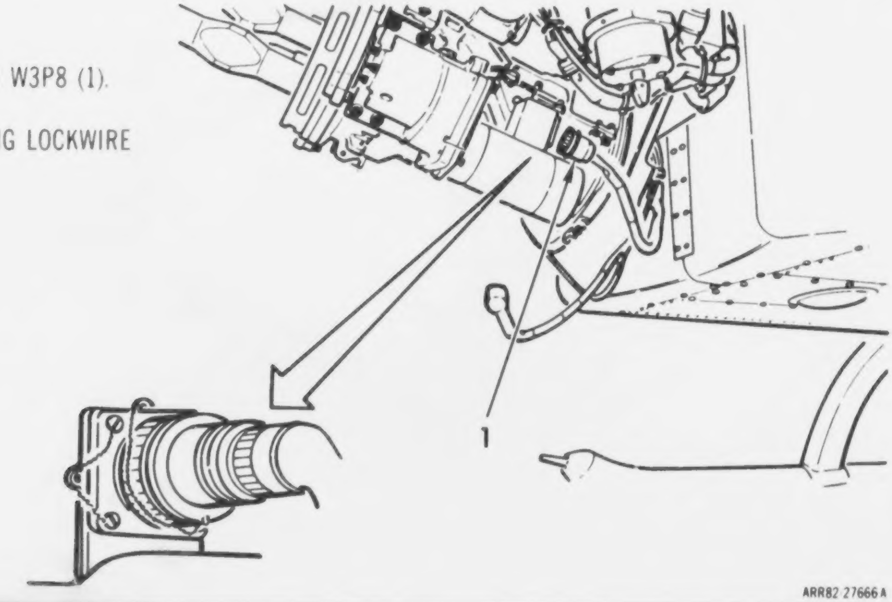
To avoid injury, do not put hands between turret and saddle.

8. CONNECT CONNECTOR W2P3 (1).
9. LOCKWIRE W2P3 USING LOCKWIRE (ITEM 4, APPX D).



ARR82 27665

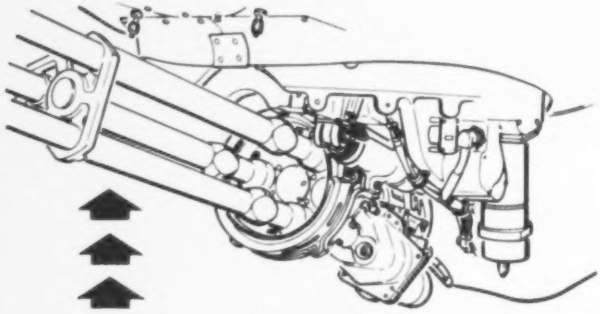
10. CONNECT CONNECTOR W3P8 (1).
11. LOCKWIRE W3P8 USING LOCKWIRE (ITEM 5, APPX D).



ARR82 27666 A

INSTALLATION (cont)

12. RELEASE ELEVATION DRIVE MOTOR BRAKE AND MANUALLY POSITION BARREL CLUSTER TO STOW POSITION. APPLY ELEVATION DRIVE MOTOR BRAKE.

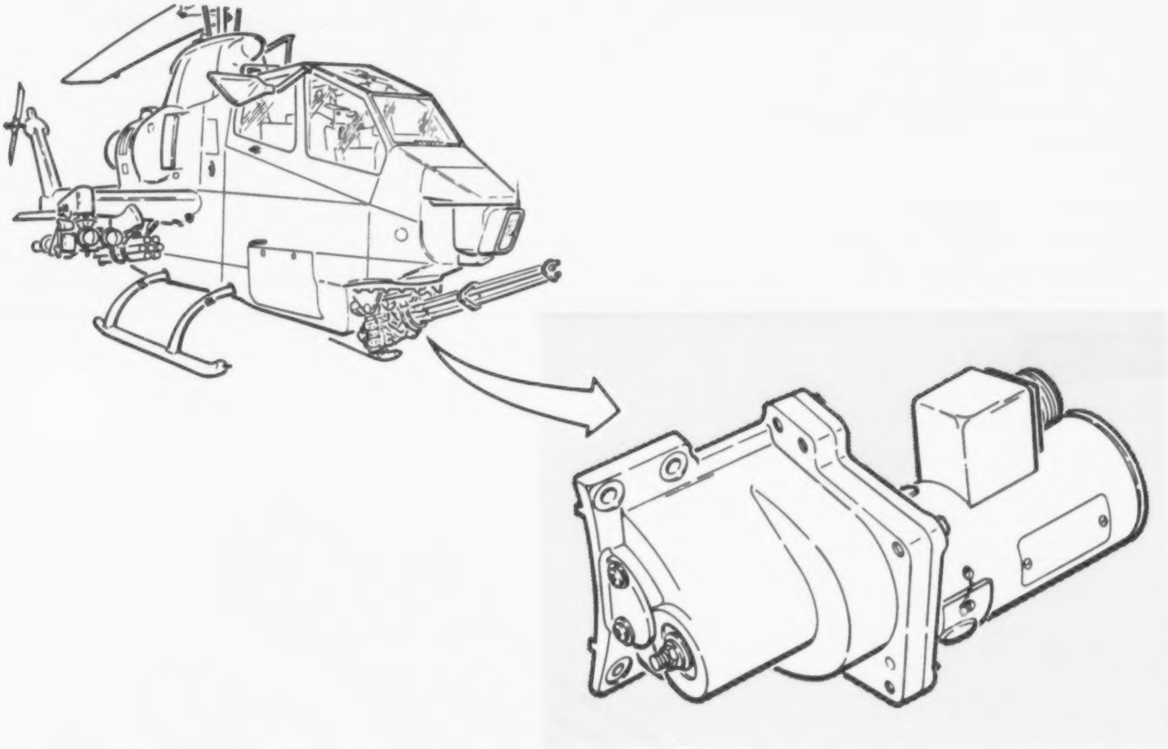


ARR82 27667

END OF TASK

Section IX. MAINTENANCE OF GUN DRIVE

Section Contents	Para
Removal/Installation of Gun Drive	3-53
Repair of Gun Drive	3-53.1



3-53. REMOVAL/INSTALLATION OF GUN DRIVE

DESCRIPTION

This task covers: Removal and installation of gun drive.

INITIAL SETUP

Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental

Personnel Required:
  68M Aircraft Weapon Systems
    Repairer

Equipment Conditions:
  REMOVAL OF M197 GUN
    performed, para 3-45.

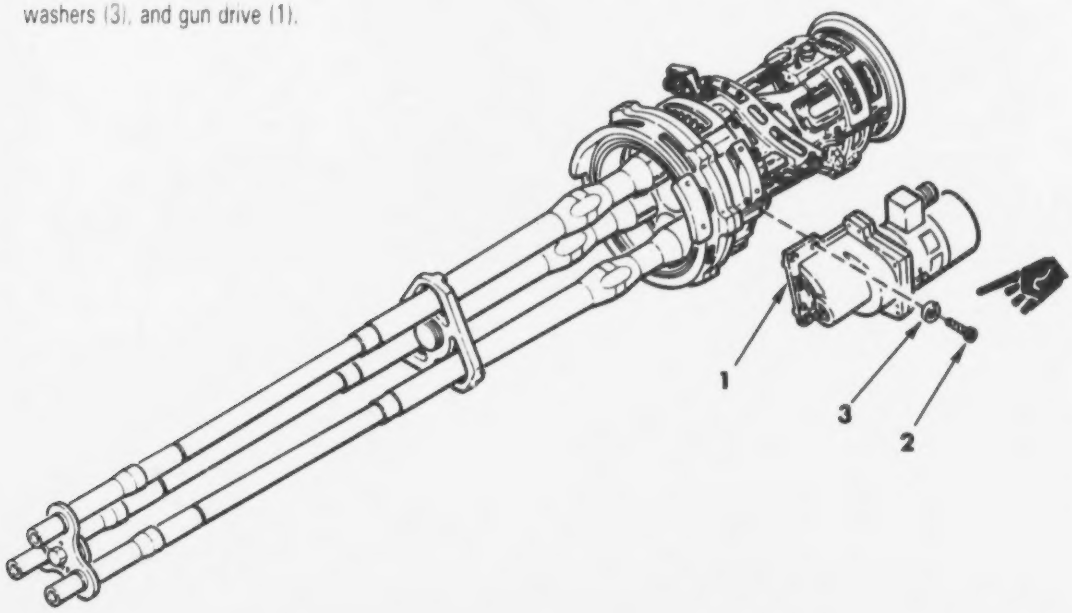
NOTE

Gun drive may be removed/installed with M197 gun installed by disconnecting/connecting W3P8 and performing this task.

REMOVAL

1. REMOVE GUN DRIVE (1).

   Remove four bolts (2), four washers (3), and gun drive (1).

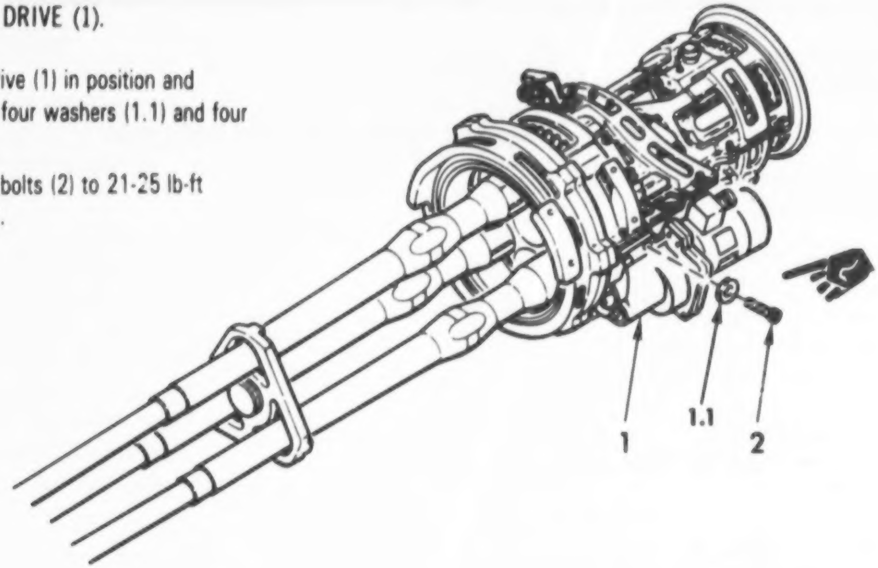


INSTALLATION

2. INSTALL GUN DRIVE (1).

   a. Place gun drive (1) in position and secure with four washers (1.1) and four bolts (2).

   b. Torque four bolts (2) to 21-25 lb-ft (28-34 N.m).



END OF TASK

3-53.1. REPAIR OF GUN DRIVE

DESCRIPTION

This task covers: Disassembly, cleaning, inspection, and assembly.

INITIAL SETUP

Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental

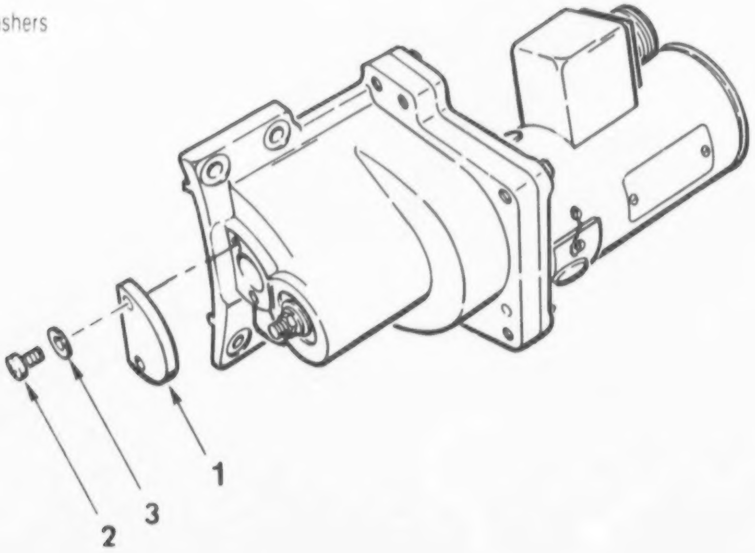
Personnel Required:
  68M Aircraft Weapon Systems
    Repairman

Equipment Conditions:
  REMOVAL/INSTALLATION OF GUN DRIVE
    performed, para 3-53.

DISASSEMBLY

1 REMOVE GUN RETAINER PLATE (1).

Remove two bolts (2), two flat washers (3), and gun retainer plate (1).

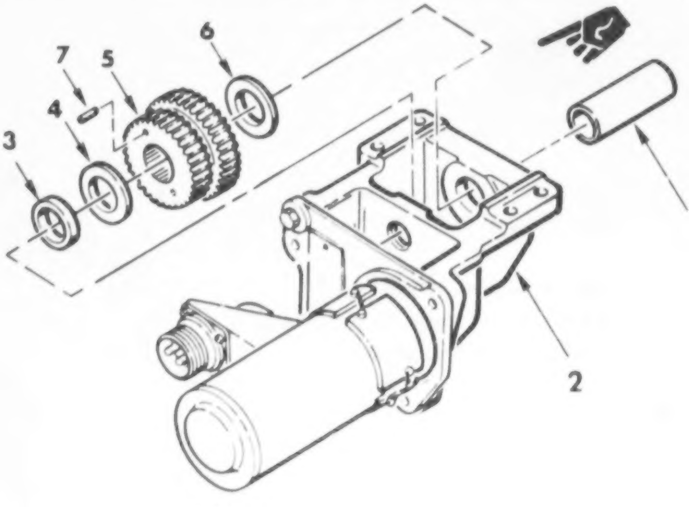


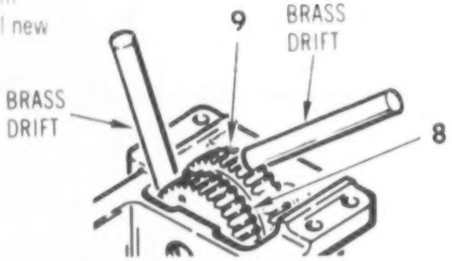
DISASSEMBLY (cont)

2. REMOVE BEARING (1).

   a. Slide bearing (1) from drive housing (2); removing spacer (3), washer (4), cluster gear (5), and washer (6).

   b. If bearing (1) cannot be easily removed, two pins (7) must be sheared. Wedge one brass drift between tooth of gear (8) and drive housing (2). Using another brass drift, drive gear (9) until two pins (7) shear. Note orientation of one gear to the other. Remove pieces of pins from each gear and immediately install new pins (7).





CLEANING

3. PERFORM GENERAL INSPECTION PROCEDURES IN ACCORDANCE WITH SECTION IV.

INSPECTION

4. PERFORM GENERAL INSPECTION PROCEDURES IN ACCORDANCE WITH SECTION IV.

5. INSPECT PARTS IN ACCORDANCE WITH TABULATED DATA.

Component	Possible Defect	Remedy
Cluster Gear	Check for sheared pins	Replace pins.
	Chipped or broken gear teeth	Replace cluster gear.
	Visually check bearing for corrosion or wear	Replace cluster gear.

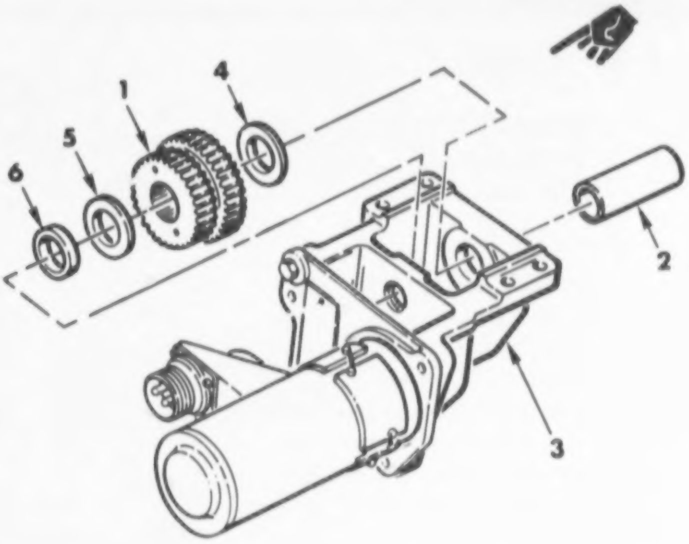
3-53.1 REPAIR OF GUN DRIVE (cont)

ASSEMBLY

6. INSTALL CLUSTER GEAR (1).

   a. Insert bearing (2) through rear hole in drive housing (3).

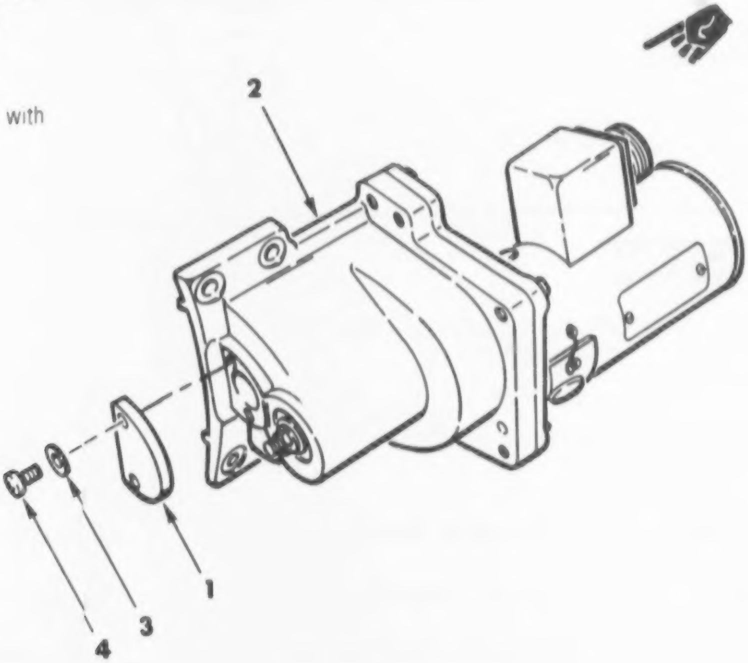
   b. Install washer (4), cluster gear (1), washer (5), and spacer (6) while sliding bearing (2) into drive housing (3).



7. INSTALL GUN RETAINER PLATE (1).

   a. Install gun retainer plate (1) on drive housing (2) and secure using two washers (3) and two screws (4).

   b. Coat gear teeth on installed parts with grease.



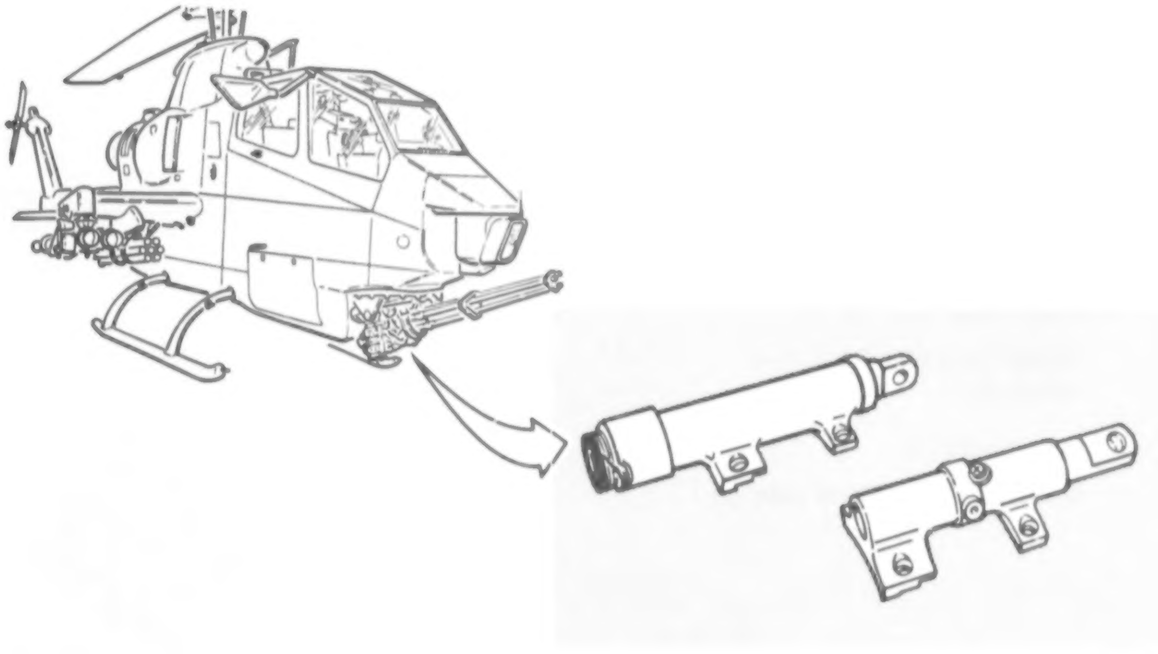
Section X. MAINTENANCE OF RECOIL ADAPTER AND SLIDE

Section Contents — Para

Removal/Installation of Recoil Adapter and Slider 3-54

Repair of Recoil Adapter 3-55

Repair of Slider 3-55.1



3-54. REMOVAL/INSTALLATION OF RECOIL ADAPTER AND SLIDER

DESCRIPTION

This task covers: Removal and installation.

INITIAL SETUP

Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental

Personnel Required:
  68M Aircraft Weapon Systems
    Repairer

Equipment Conditions:
  REMOVAL OF M197 GUN
    performed, para 3-45.

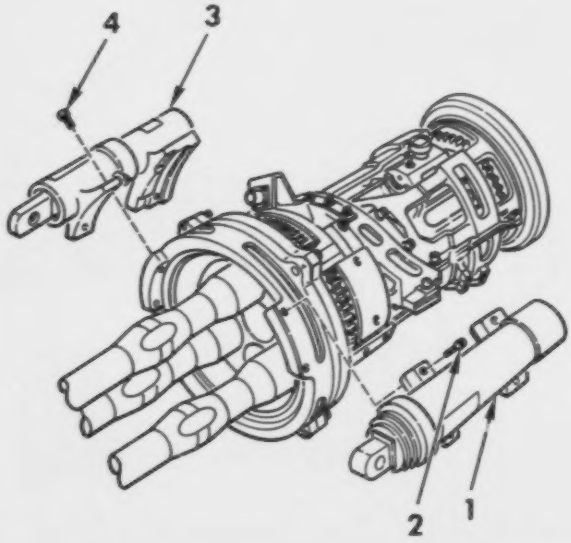
REMOVAL

1. REMOVE RECOIL ADAPTER (1).

   Remove four bolts (2) and recoil adapter (1).

2. REMOVE SLIDER (3).

   Remove four bolts (4) and slider (3).



ARR82-27671

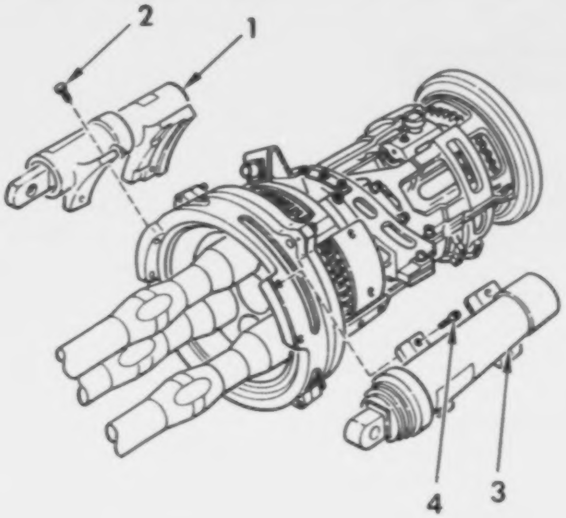
INSTALLATION

3. INSTALL SLIDER (1).

Install slider (1) and secure using four bolts (2). Torque bolts (2) to **350 - 400** lb-in. (**39.54-45.19** N.m).

4. INSTALL RECOIL ADAPTER (3).

Install recoil adapter (3) and secure using four bolts (4). Torque bolts (4) to **350-400** lb-in. (**39.54-45.19** N.m).



ARR82-27672

END OF TASK

best copy available

3-55. REPAIR OF RECOIL ADAPTER

DESCRIPTION

This task covers: Disassembly, cleaning, inspection, repair, and assembly.

INITIAL SETUP

Tools/Test and Support Equipment:
- Tool Set, A/C Armament Repairman: Basic
- Tool Set, A/C Armament Repairman: Supplemental

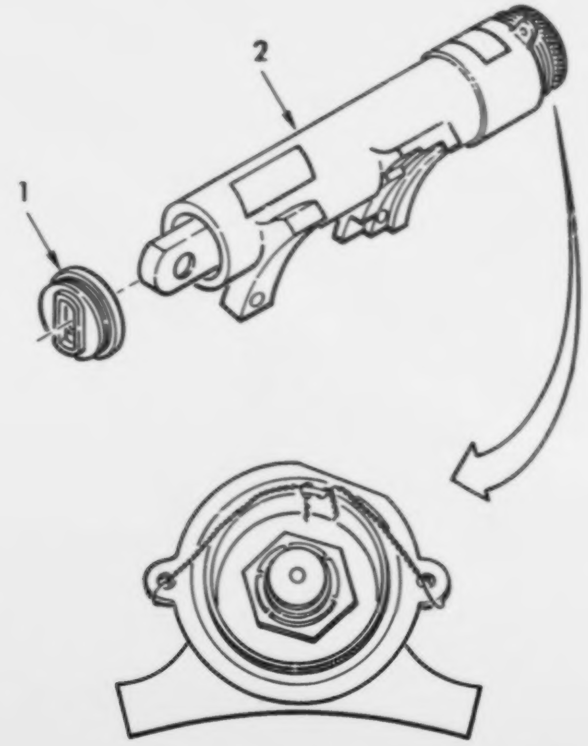
Materials:
- Abrasive cloth (item 14, Appx D)
- Abrasive cloth (item 15, Appx D)
- Alcohol (item 13, Appx D)
- Grease (item 3, Appx D)
- Grease (graphite) (item 16, Appx D)
- Lockwire (item 4, Appx D)
- Solid film lubricant (item 7, Appx D)

Personnel Required:
- 68M Aircraft Weapon Systems Repairer

Equipment Conditions:
- REMOVAL/INSTALLATION OF RECOIL ADAPTER AND SLIDER performed, para 3-54.

DISASSEMBLY

1. REMOVE COVER (1) FROM RECOIL ADAPTER (2).
2. REMOVE LOCKWIRE.



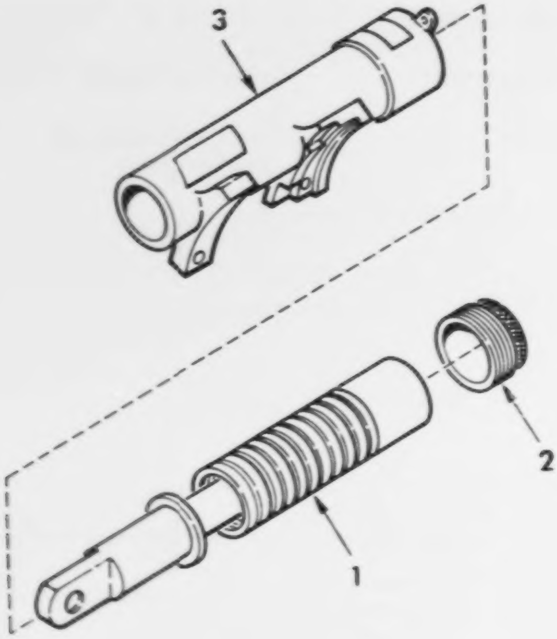
ARR82 27677

DISASSEMBLY (cont)

3. REMOVE SPINDLE (1).

   a. Remove spindle retainer (2).

   b. Withdraw spindle (1) from housing (3).



CLEANING

4. PERFORM GENERAL CLEANING PROCEDURES IN ACCORDANCE WITH SECTION IV. REMOVE GRAPHITE GREASE FROM SPINDLE RINGS WITH CLOTH AND RECOAT INCLINED SURFACES OF RINGS WITH GREASE (ITEM 16, APPX D) AFTER SPINDLE INSPECTION.

INSPECTION

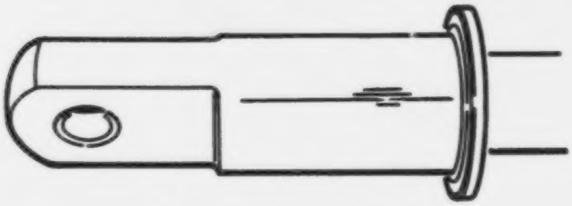
5. PERFORM GENERAL INSPECTION PROCEDURES IN ACCORDANCE WITH SECTION IV AND TABULATED DATA:

Component	**Possible Defect**	**Remedy**
Cover	Cracks, tears, and deterioration	Replace.
Spindle Retainer	Cracks, deformation, and damaged threads	Notify Aviation Intermediate Maintenance.

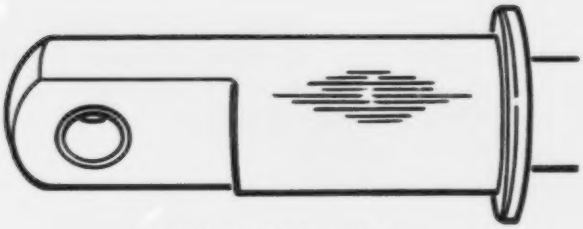
3-55. REPAIR OF RECOIL ADAPTER (cont)

INSPECTION (cont)

Component	Possible Defect	Remedy
Spindle	Cracks, deformation, and damaged threads	Notify Aviation Intermediate Maintenance.
	Excessively worn	Notify Aviation Intermediate Maintenance.
	Shiny surfaces	Apply solid film lubricant (page 3-300.3).
	Galling*	Replace.



SPINDLE ACCEPTABLE



SPINDLE NOT ACCEPTABLE

ARR82-27679

Component	Possible Defect	Remedy
Housing	Elongated mounting holes, cracks and damaged threads	Replace recoil adapter.

---

*Galling is a rough area containing small or large, deep or shallow gouges and/or abrasions. Galling concentrated in a 13/16-in. (0.81-mm) area or larger (approximately the size of a US nickel) will render the recoil adapter spindle inoperable.

REPAIR

6. SAND SPINDLE CORRODED SURFACES AND SMALL GOUGE AREAS WITH ABRASIVE CLOTH (ITEM 14, APPX D). POLISH WITH ABRASIVE CLOTH (ITEM 15, APPX D).

WARNING
Alcohol is flammable and should not be used near an open flame or in a smoking area. Use only in well ventilated areas.

CAUTION
Do not allow alcohol to get on spindle rings.

7. CLEAN WITH ALCOHOL.

WARNING
When using solid film lubricant, be sure area is well ventilated.

CAUTION
Be sure spindle surface to be treated is thoroughly cleaned and dried prior to application of solid film lubricant.

8. SPRAY A COAT OF SOLID FILM LUBRICANT ON SHINY SURFACES.

NOTE
Permit treated parts to air cure for a minimum of 18 hours at 77° ± 3°F (25° ± 2°C) before reassembly.

Do not handle parts during curing period.

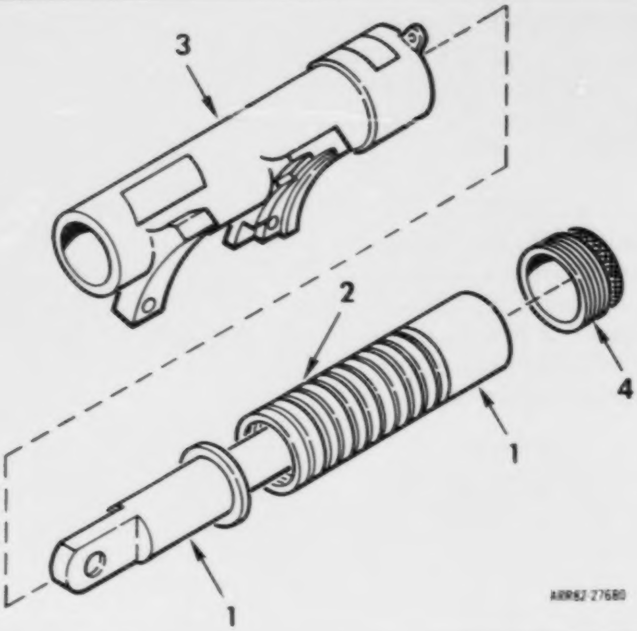
3-55. REPAIR OF RECOIL ADAPTER (cont)

ASSEMBLY

9. LUBRICATE OUTSIDE BEARING SURFACES (1) OF SPINDLE (2) WITH GREASE.

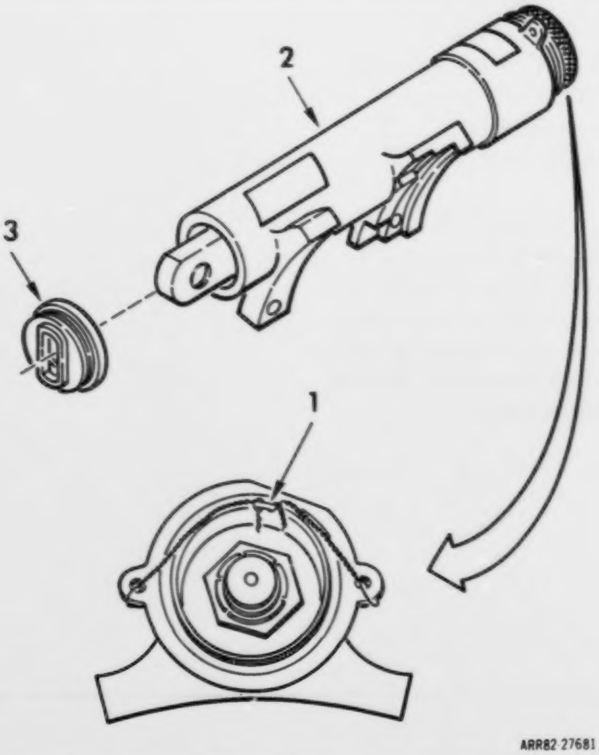
10. INSTALL SPINDLE (2).

    Insert spindle (2) into housing (3) and secure with spindle retainer (4). Turn spindle retainer into housing until spindle end play is removed.



11. LOCKWIRE SPINDLE RETAINER (1) TO HOUSING (2), AS ILLUSTRATED, TO PREVENT MOVEMENT IN EITHER DIRECTION.

12. INSTALL COVER (3).



END OF TASK

3-55.1. REPAIR OF SLIDER

DESCRIPTION

This task covers: Disassembly, cleaning, inspection, repair, and assembly

INITIAL SETUP

Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental

Materials:
  Abrasive cloth (item 14, Appx D)
  Abrasive cloth (item 15, Appx D)
  Alcohol (item 13, Appx D)
  Grease (item 3, Appx D)
  Solid film lubricant (item 7, Appx D)

Personnel Required:
  68M Aircraft Weapon Systems
    Repairer

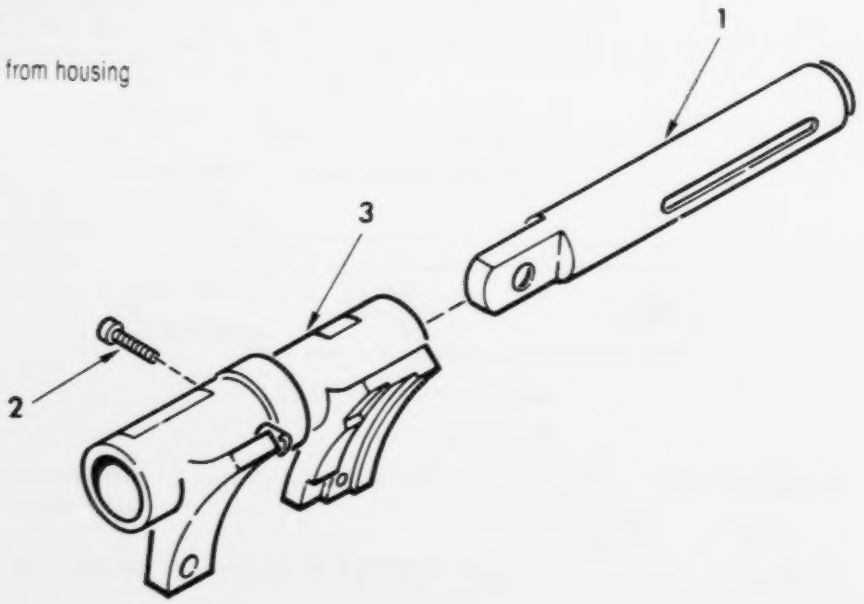
Equipment Conditions:
  REMOVAL/INSTALLATION OF
  RECOIL ADAPTER AND SLIDER
  performed, para 3-54.

DISASSEMBLY

1. REMOVE SPINDLE (1).

   a. Remove screw (2).

   b. Remove spindle (1) from housing (3).



ARR82 27673

3-55.1. REPAIR OF SLIDER (cont)

CLEANING

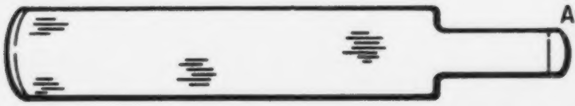
2. PERFORM GENERAL CLEANING PROCEDURES IN ACCORDANCE WITH SECTION IV.

INSPECTION

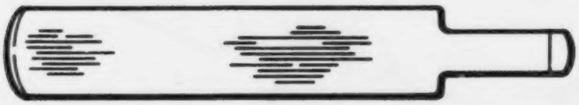
3. PERFORM GENERAL INSPECTION PROCEDURES IN ACCORDANCE WITH SECTION IV.

4. INSPECT PARTS IN ACCORDANCE WITH TABULATED DATA:

Component	Possible Defect	Remedy
Spindle	Cracks and deformation	Notify Aviation Intermediate Maintenance.
	Excessively worn	Notify Aviation Intermediate Maintenance.
	Shiny surfaces	Apply solid film lubricant.
	Galling*	**See Step 5 if under 13/16-in. If over 13/16-in., notify Aviation Intermediate Maintenance.**



SPINDLE ACCEPTABLE



SPINDLE NOT ACCEPTABLE

ARR82 27674

Component	Possible Defect	Remedy
Lubrication Fitting	Will not accept lubricant, damaged, missing	Notify Aviation Intermediate Maintenance.
Housing	Elongated mounting holes, cracks, and damaged threads	Replace slider.

***Galling is a rough area containing small or large, deep or shallow gouges and/or abrasions. Galling concentrated in a 13/16-in. (0.81-mm) area or larger (approximately the size of a U.S. nickel) will render the slider assembly inoperable.**

REPAIR

5. SAND SPINDLE CORRODED SURFACES AND SMALL GOUGE AREAS WITH ABRASIVE CLOTH (ITEM 14, APPX D). POLISH WITH ABRASIVE CLOTH (ITEM 15, APPX D).

WARNING

Alcohol is flammable and should not be used near an open flame or in a smoking area. Use only in well ventilated areas.

CAUTION

Do not allow alcohol to get on spindle rings.

6. CLEAN WITH ALCOHOL.

WARNING

When using solid film lubricant, be sure area is well ventilated.

CAUTION

Be sure spindle surface to be treated is thoroughly cleaned and dried prior to application of solid film lubricant.

SPRAY A COAT OF SOLID FILM LUBRICANT ON SHINY SURFACES.

7.

NOTE

Permit treated parts to air cure for a minimum of 18 hours at 77° ± 3°F (25° ± 2°C) before reassembly.

ASSEMBLY

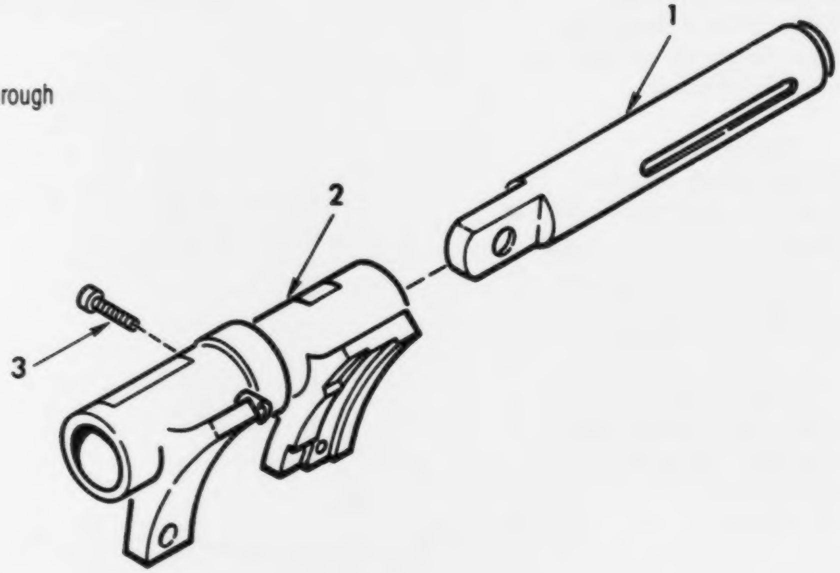
7. INSTALL SPINDLE (1).

   a. Apply a light coat of grease to outside bearing surface of spindle (1) and inside of housing (2).

   b. Insert spindle (1) into housing (2) and aline slot in spindle with hole in housing.

   c. Install screw (3).

   d. Lubricate spindle (1) through lubrication fitting.

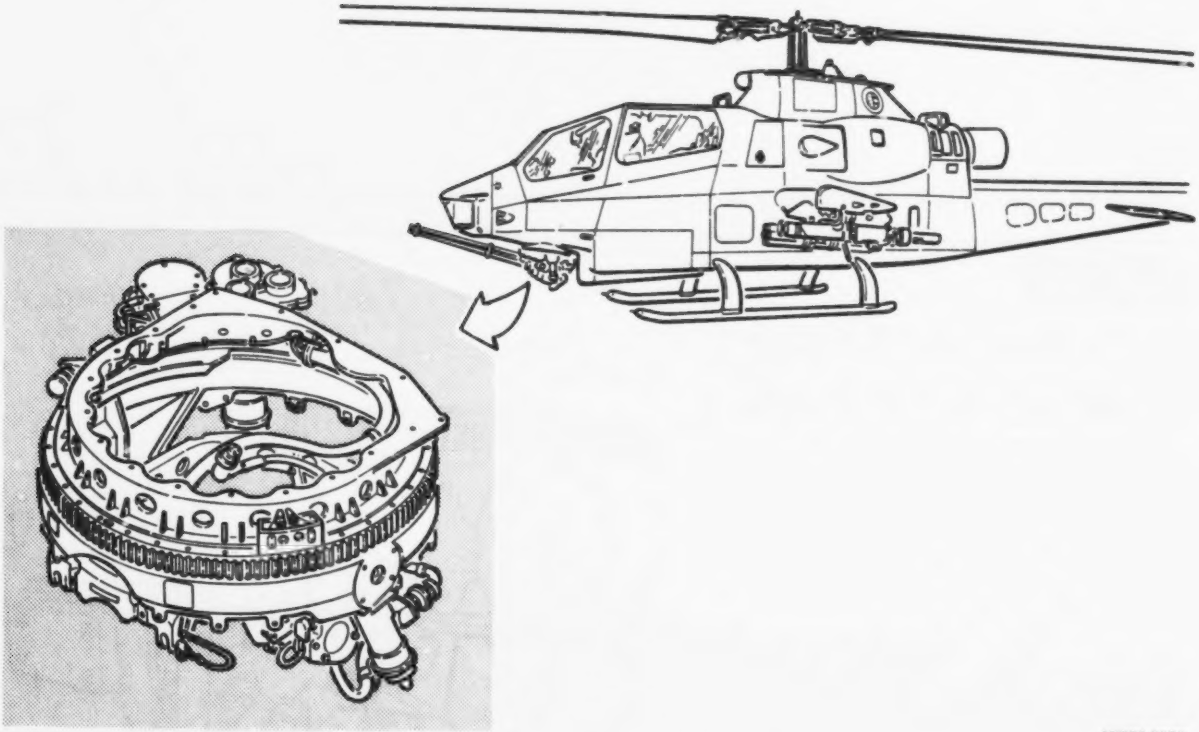


ARR82-27676

END OF TASK

Section XI. MAINTENANCE OF TURRET

Section Contents	Para
Repair of Turret Electrical Components	3-56
Repair of Azimuth and Elevation Mechanical Components	3-57
Repair of Cable Mounting Hardware	3-58



ARR83-0372

3-56. REPAIR OF TURRET ELECTRICAL COMPONENTS

DESCRIPTION

This task covers: Removal, cleaning, inspection, and installation of elevation and azimuth buffer amplifiers, elevation tachometer, elevation stow switch, elevation proximity switches, and rounds totalizer.

INITIAL SETUP

Tools/Test and Support Equipment:
- Tool Set, A/C Armament Repairman: Basic
- Tool Set, A/C Armament Repairman: Supplemental

Personnel Required:

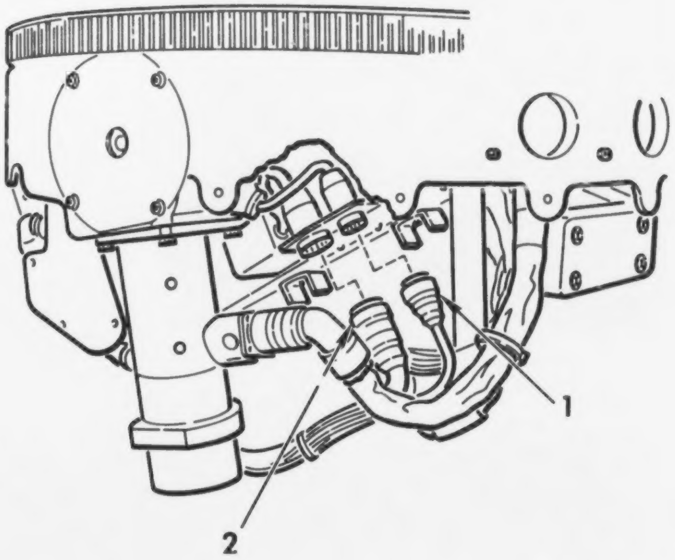
68J Aircraft Fire Control Repairer

Equipment Conditions:

HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SET-UP performed, para 2-6.

REMOVAL

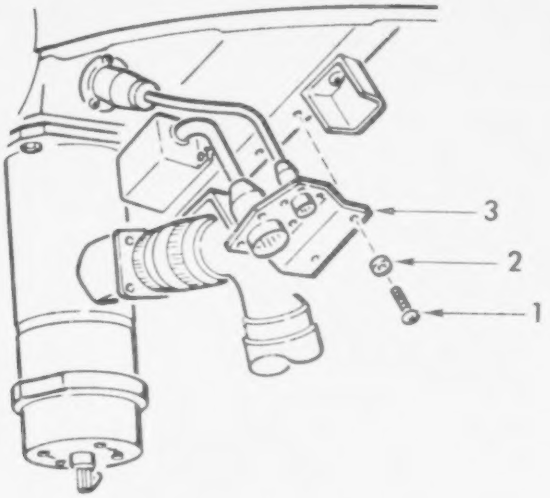
1. DISCONNECT CONNECTOR W1P12 (1).
2. DISCONNECT CONNECTOR W1P4 (2).



ARR82-25876

REMOVAL (cont)

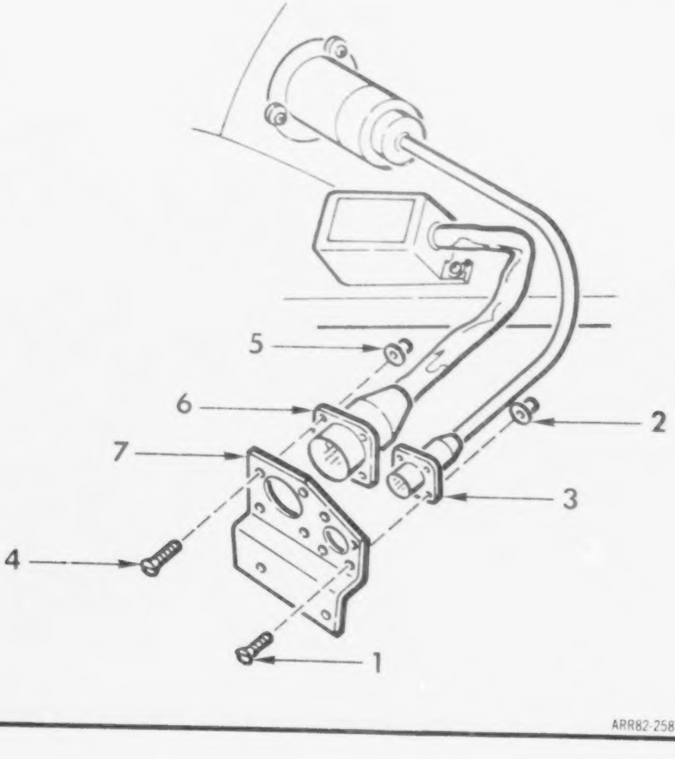
3. REMOVE TWO SCREWS (1), TWO WASHERS (2), AND CONNECTOR BRACKET (3).



ARR82-25877

4. REMOVE FOUR SCREWS (1), FOUR NUTS (2), AND ELEVATION TACHOMETER CONNECTOR (3).

5. REMOVE FOUR SCREWS (4), FOUR NUTS (5), AND ELEVATION BUFFER AMPLIFIER CONNECTOR (6) FROM CONNECTOR BRACKET (7).

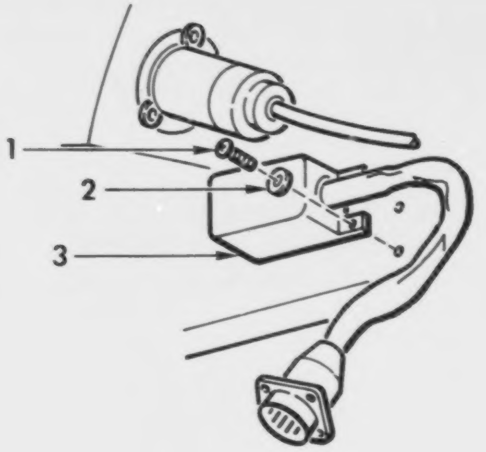


ARR82-25878

3-56. REPAIR OF TURRET ELECTRICAL COMPONENTS (cont)

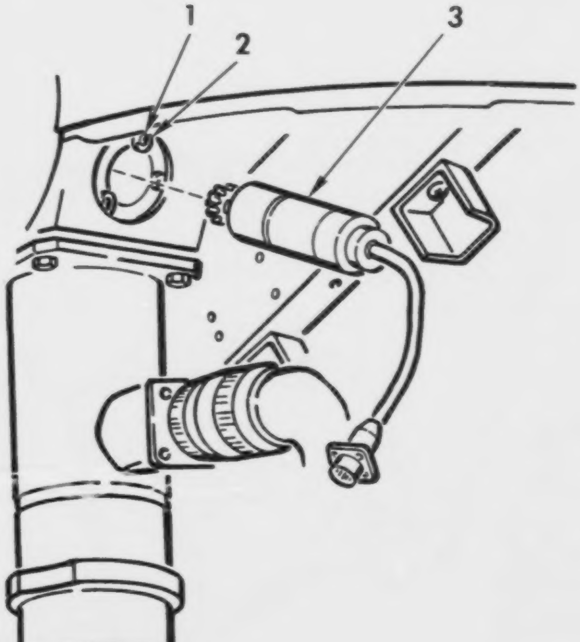
REMOVAL (cont)

6. REMOVE FOUR SCREWS (1), FOUR WASHERS (2), AND ELEVATION BUFFER AMPLIFIER (3).



ARR82-25879

7. LOOSEN THREE SCREWS (1) AND PIVOT THREE MOUNTING CLAMPS (2) OUT OF SLOT IN ELEVATION TACHOMETER (3). REMOVE TACHOMETER. DO NOT REMOVE SCREWS AND MOUNTING CLAMPS UNLESS DEFECTIVE.

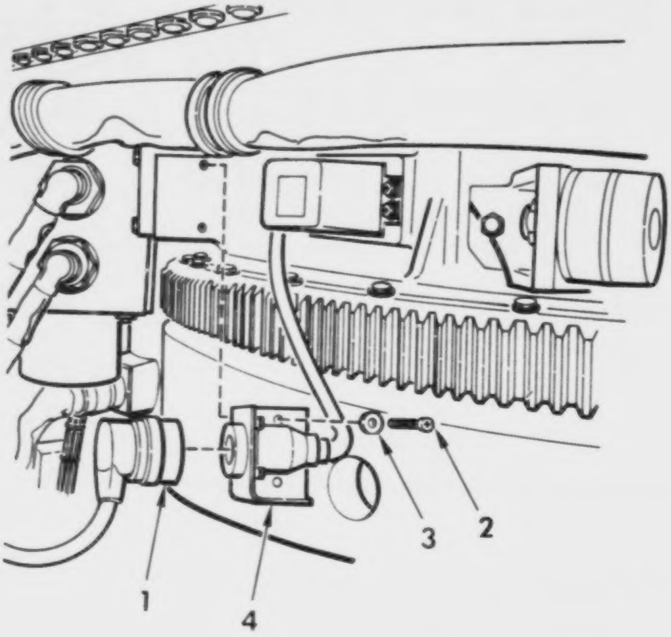


ARR82-25880

REMOVAL (cont)

8. DISCONNECT CONNECTOR W1P5 (1).

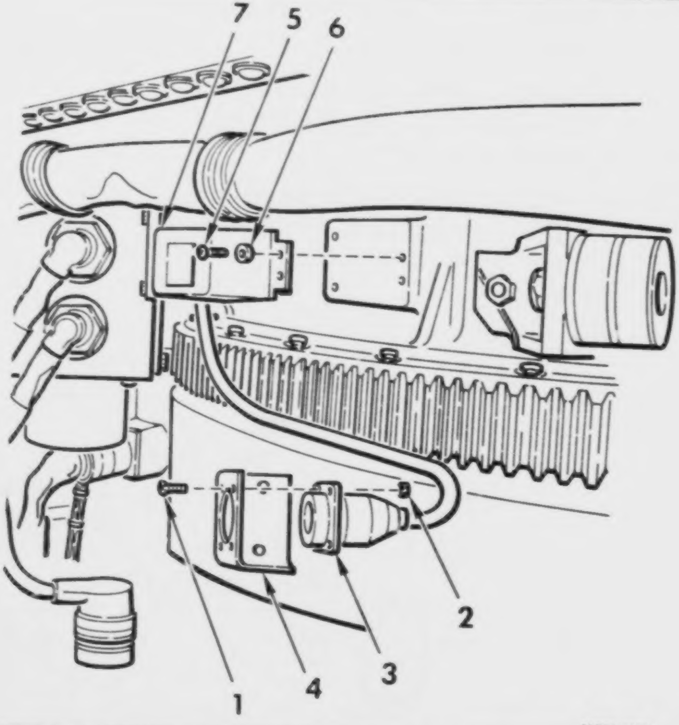
9. REMOVE TWO SCREWS (2), TWO WASHERS (3), AND CONNECTOR BRACKET (4).



ARR82-25881

10. REMOVE FOUR SCREWS (1), FOUR NUTS (2), AND AZIMUTH BUFFER AMPLIFIER CONNECTOR (3) FROM CONNECTOR BRACKET (4).

11. REMOVE FOUR SCREWS (5), FOUR WASHERS (6), AND AZIMUTH BUFFER AMPLIFIER (7).



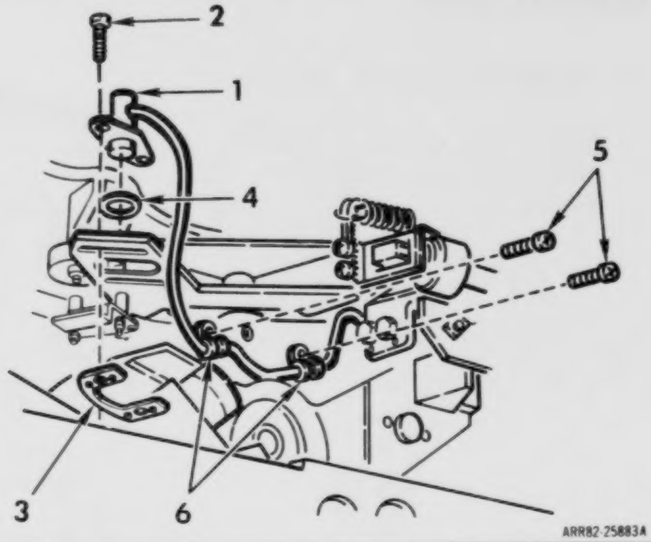
ARR82-25882

3-56. REPAIR OF TURRET ELECTRICAL COMPONENTS (cont)

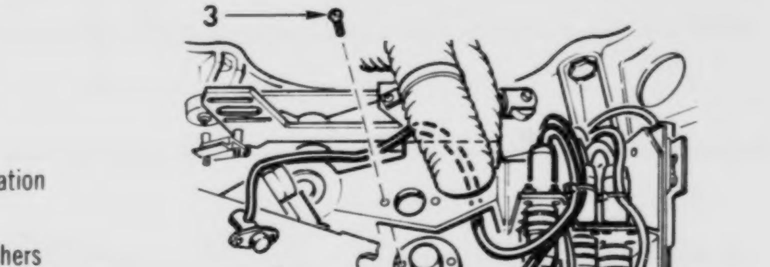
REMOVAL (cont)

12. PERFORM REMOVAL OF M197 GUN, PARA 3-45.

13. REMOVE ELEVATION PROXIMITY SWITCH S2 (1).
    a. Remove two screws (2), nut plate (3), elevation proximity switch S2 (1), and shim (4).
    b. Remove two screws (5) and two loop clamps (6).

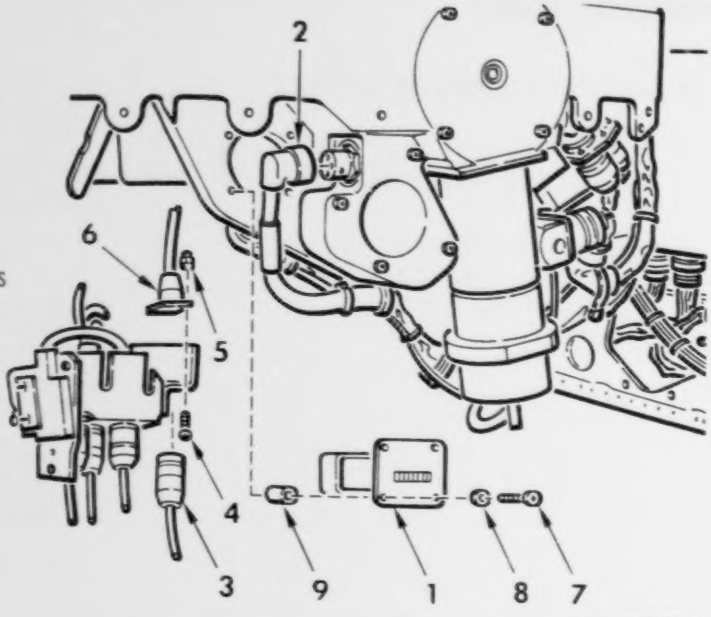


14. REMOVE ELEVATION PROXIMITY SWITCH S1 (1) AND CONNECTOR BRACKET (2).
    a. Remove two screws (3) and elevation proximity switch S1 (1).
    b. Remove two screws (4), two washers (5), and spacer (6) from elevation proximity switch S1 (1).
    c. Loosen two screws (7) and remove connector bracket (2). Do not remove screws (7) and washers (8) unless defective.
    d. Disconnect connector W5P2 (9).
    e. Remove four screws (10), four nuts (11), and connector A7J10 (12).



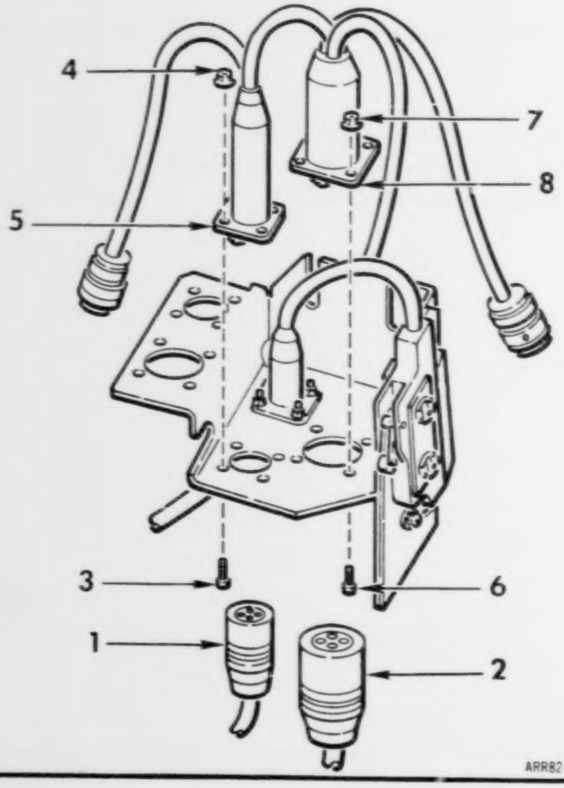
REMOVAL (cont)

15. REMOVE ROUNDS TOTALIZER (1).
    a. Disconnect connector W1P6 (2) and W5P1 (3).
    b. Remove four screws (4), four nuts (5), and connector A7J17 (6).
    c. Remove four screws (7), four washers (8), four spacers (9), and rounds totalizer (1).



ARR82 25885

16. DISCONNECT CONNECTOR W1P17 (1).
17. DISCONNECT CONNECTOR W1P13 (2).
18. REMOVE FOUR SCREWS (3), FOUR NUTS (4), AND CONNECTOR W5J1 (5).
19. REMOVE FOUR SCREWS (6), FOUR NUTS (7), AND CONNECTOR W5J2 (8).

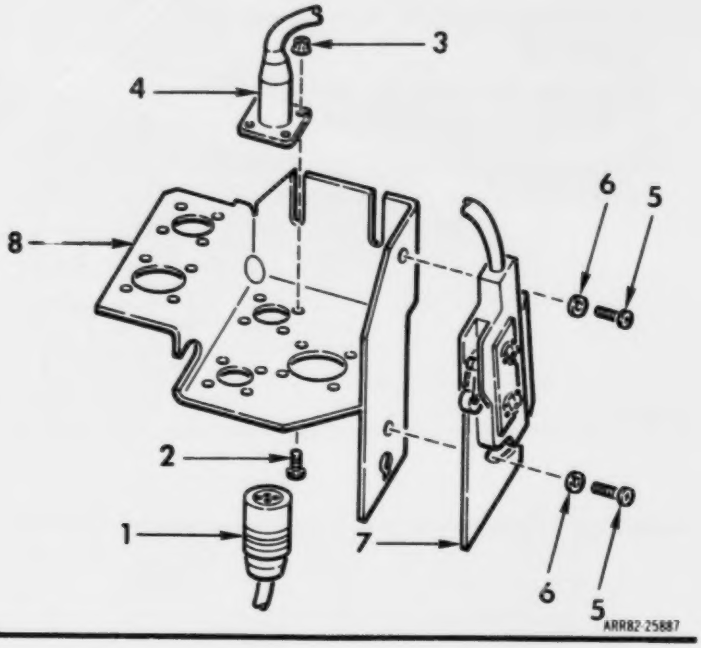


ARR82 25886

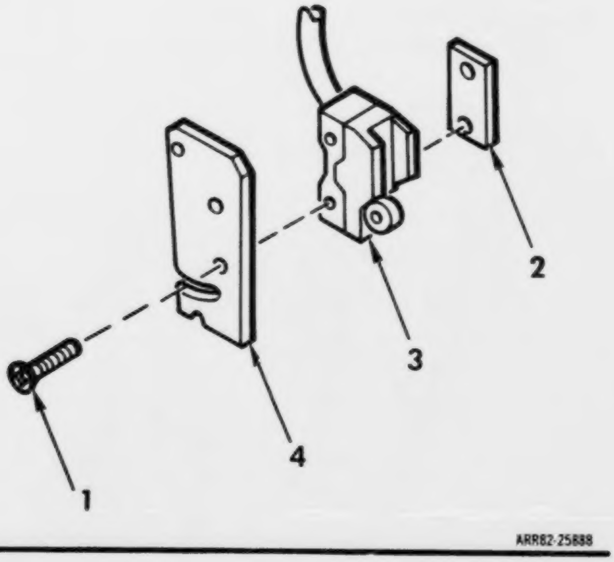
3-56. REPAIR OF TURRET ELECTRICAL COMPONENTS (cont)

REMOVAL (cont)

20. DISCONNECT CONNECTOR W1P18 (1).
21. REMOVE FOUR SCREWS (2), FOUR NUTS (3), AND CONNECTOR A7J22 (4).
22. REMOVE TWO SCREWS (5), TWO WASHERS (6), AND ELEVATION STOW SWITCH (7) FROM CONNECTOR BRACKET (8).


3
4
6
5
8
2
1
7
6
5
ARR82-25887

23. REMOVE TWO SCREWS (1), NUT PLATE (2), AND ELEVATION STOW SWITCH (3) FROM ADJUSTING COVER (4).


2
3
4
1
ARR82-25888

CLEANING

24. PERFORM GENERAL CLEANING PROCEDURES IN ACCORDANCE WITH SECTION IV.

INSPECTION

25. PERFORM GENERAL INSPECTION PROCEDURES IN ACCORDANCE WITH SECTION IV.

26. INSPECT PARTS IN ACCORDANCE WITH TABULATED DATA.

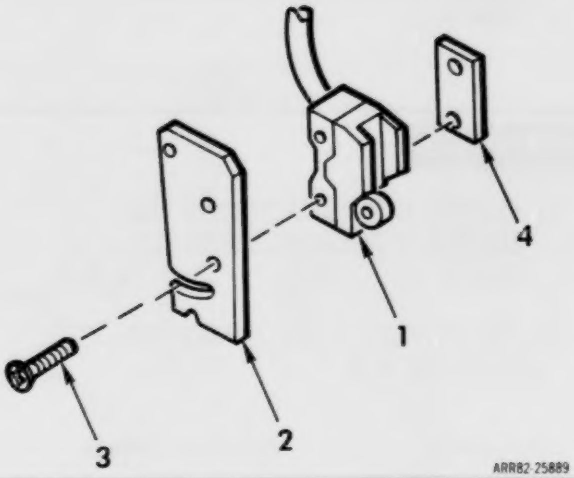
Component	Possible Defect	Remedy
Connector Brackets	Bent or cracked	Straighten or replace.
Elevation Proximity Switch	Damaged cable covering	Repair with electrical tape.
Proximity Switches	Cracked case	Replace.
Connector	Bent connector pins	Straighten.
Azimuth Buffer Amplifier	Cracked case Damaged cable covering Bent connector pins	Replace. Repair with electrical tape. Straighten.
Elevation Stow Switch	Defective switch Damaged cable covering Bent connector pins	Replace. Repair with electrical tape. Straighten.
Adjusting Plate (Elevation Stow Switch)	Bent or cracked	Straighten or replace.
Rounds Totalizer	Defective Damaged cable covering Bent connector pins	Replace. Repair with electrical tape. Straighten.
Elevation Tachometer	Noisy rotor bearings Bent shaft Damaged cable covering Bent connector pins	Replace. Replace. Repair with electrical tape. Straighten.

3-56. REPAIR OF TURRET ELECTRICAL COMPONENTS (cont)

INSTALLATION

27. ALINE MOUNTING HOLES OF ELEVATION STOW SWITCH (1) AND ADJUSTING COVER (2).

28. SECURE ELEVATION STOW SWITCH (1) TO ADJUSTING COVER (2) USING TWO SCREWS (3) AND NUT PLATE (4).

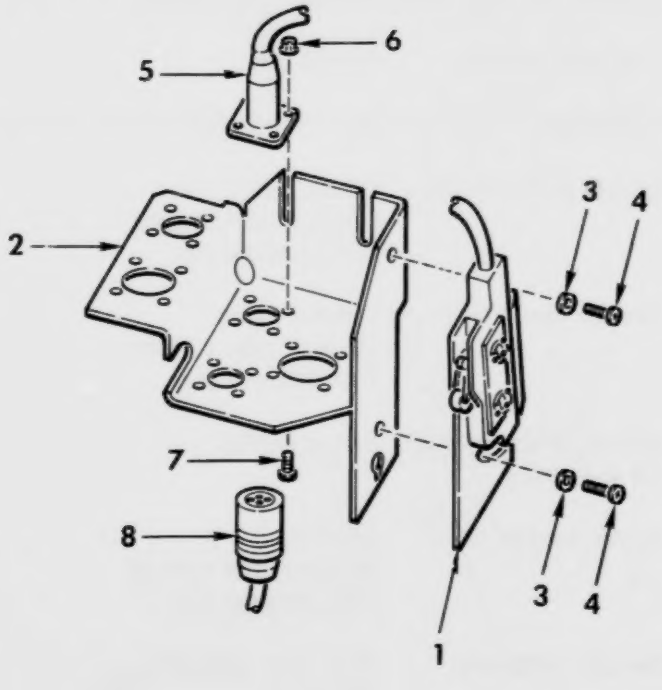


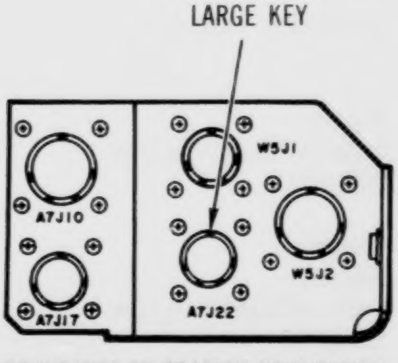
ARR82-25889

29. POSITION ADJUSTING COVER (1) ON CONNECTOR BRACKET (2) AND SECURE USING TWO WASHERS (3) AND TWO SCREWS (4).

30. ORIENT CONNECTOR A7J22 (5) AND SECURE USING FOUR NUTS (6) AND FOUR SCREWS (7).

31. CONNECT CONNECTOR W1P18 (8).





CONNECTOR TO BRACKET ORIENTATION

ARR82-25890A

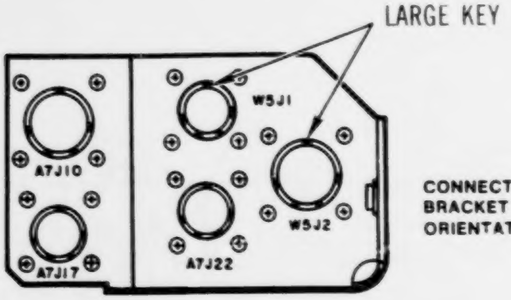
INSTALLATION (cont)

32. ORIENT CONNECTOR W5J2 (1) AND SECURE USING FOUR NUTS (2) AND FOUR SCREWS (3).

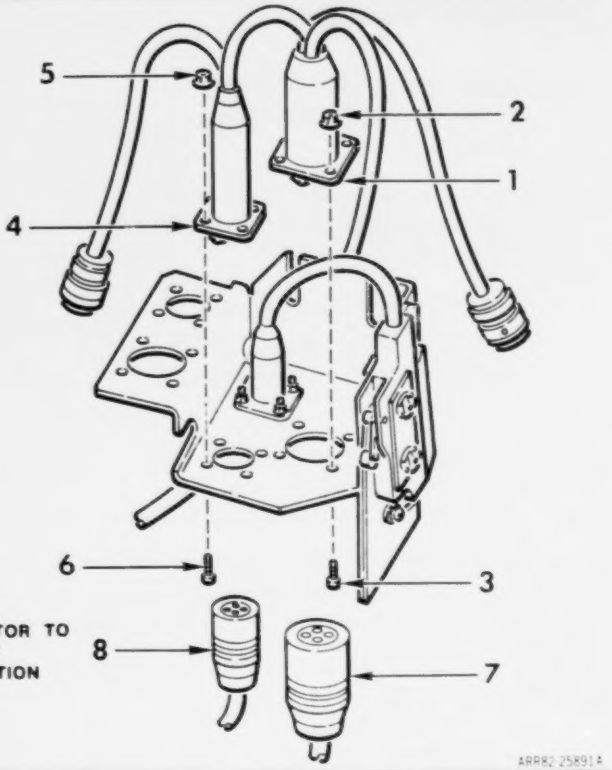
33. ORIENT CONNECTOR W5J1 (4) AND SECURE USING FOUR NUTS (5) AND FOUR SCREWS (6).

34. CONNECT CONNECTOR W1P13 (7).

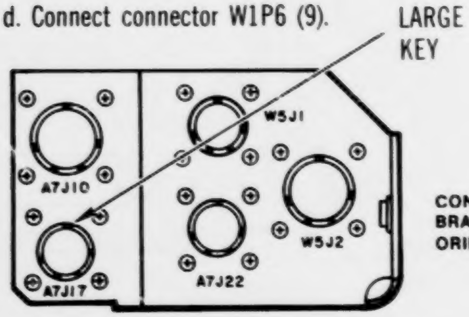
35. CONNECT CONNECTOR W1P17 (8).


LARGE KEY
A7J10
A7J17
W5J1
A7J22
W5J2

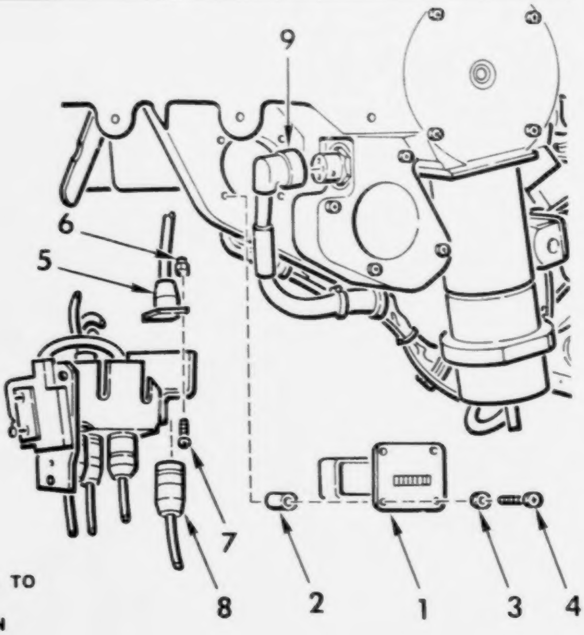
CONNECTOR TO BRACKET ORIENTATION


5
2
1
4
6
3
8
7
ARR82-25891A

36. INSTALL ROUNDS TOTALIZER (1).
    a. Install rounds totalizer (1) and secure using four spacers (2), four washers (3), and four screws (4).
    b. Orient connector A7J17 (5) and secure using four nuts (6) and four screws (7).
    c. Connect connector W5P1 (8).
    d. Connect connector W1P6 (9).


LARGE KEY
A7J10
A7J17
W5J1
A7J22
W5J2

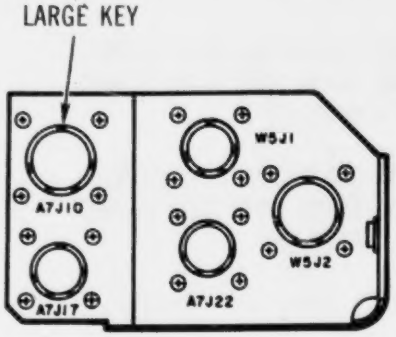
CONNECTOR TO BRACKET ORIENTATION


9
6
5
7
8
2
1
3
4
ARR82-25892A

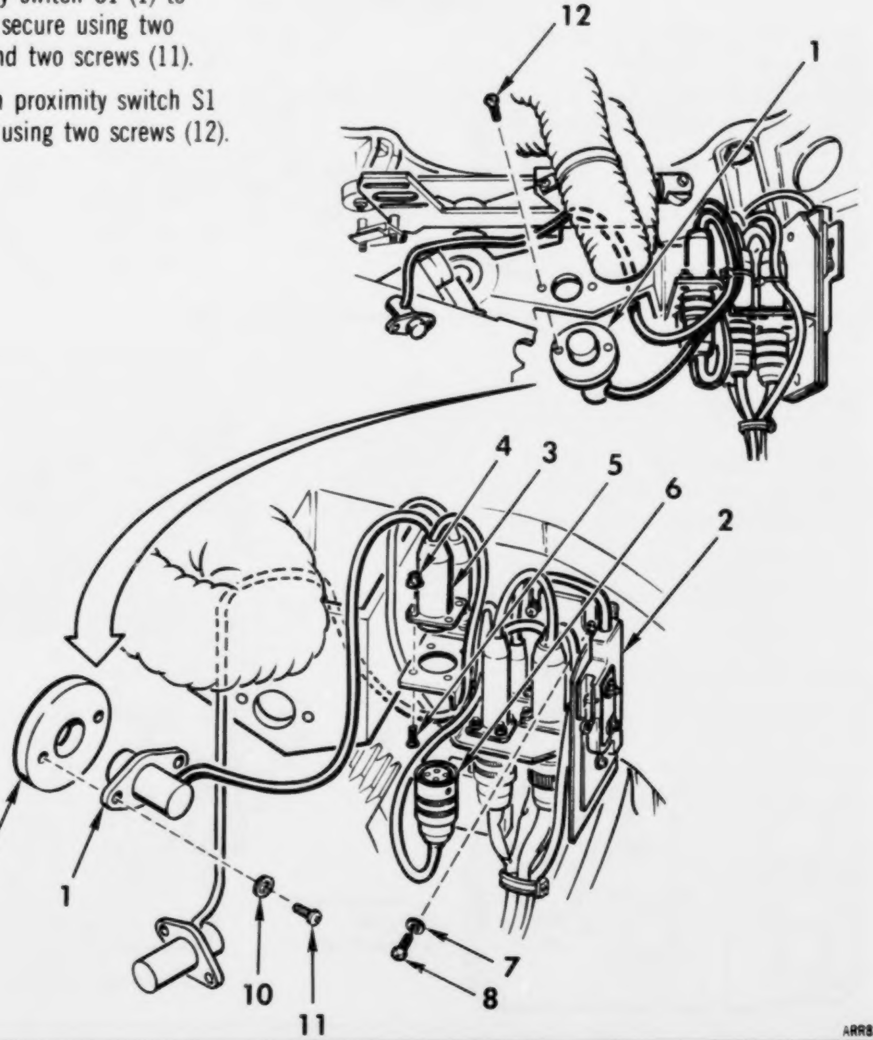
3-56. REPAIR OF TURRET ELECTRICAL COMPONENTS (cont)

INSTALLATION (cont)

37. INSTALL ELEVATION PROXIMITY SWITCH S1 (1) AND CONNECTOR BRACKET (2).
    - a. Orient connector A7J10 (3) and secure using four nuts (4) and four screws (5).
    - b. Connect connector W5P2 (6).
    - c. Install connector bracket (2) and secure using two washers (7) and two screws (8).
    - d. Install proximity switch S1 (1) to spacer (9) and secure using two washers (10) and two screws (11).
    - e. Install elevation proximity switch S1 (1) and secure using two screws (12).


LARGE KEY
A7J10
A7J17
W5J1
W5J2
A7J22

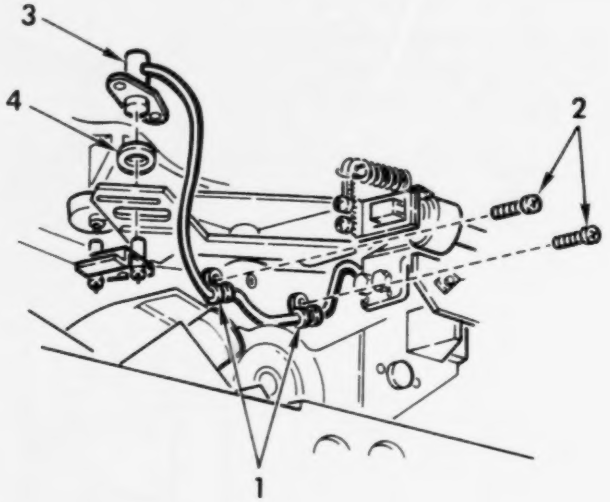
CONNECTOR TO BRACKET ORIENTATION


12
1
4
3
5
6
2
9
1
10
11
7
8
ARR82-25893A

INSTALLATION (cont)

38. ROUTE CABLE, INSTALL TWO LOOP CLAMPS (1), AND SECURE USING TWO SCREWS (2).

39. POSITION ELEVATION PROXIMITY SWITCH S2 (3) AND SHIM (4) ON BRACKET.

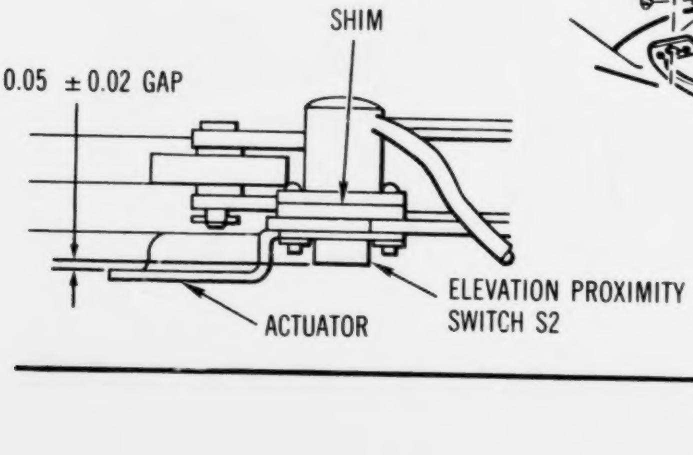


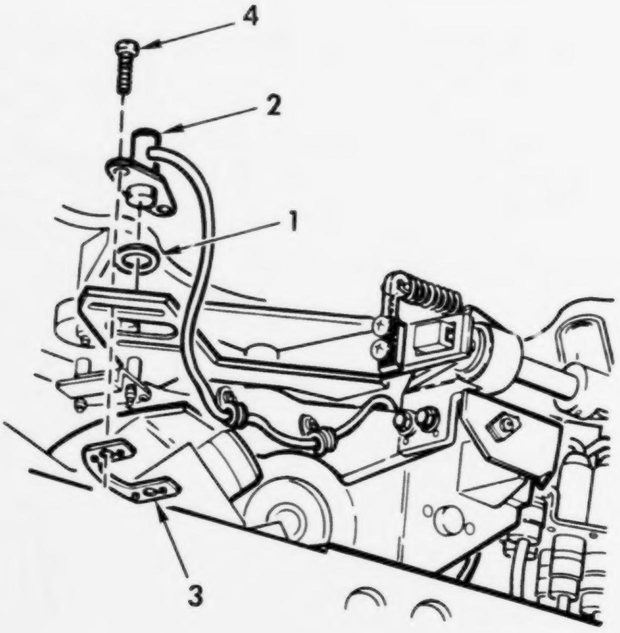
ARR82-25894A

40. MEASURE AIR GAP. IF REQUIRED, PEEL SHIM (1) AND REMEASURE UNTIL SPECIFIED AIR GAP IS OBTAINED.

41. SECURE ELEVATION PROXIMITY SWITCH S2 (2) TO BRACKET USING NUT PLATE (3), AND TWO SCREWS (4).

42. PERFORM INSTALLATION OF M197 GUN, PARA 3-52.


SHIM
0.05 ± 0.02 GAP
ACTUATOR
ELEVATION PROXIMITY SWITCH S2



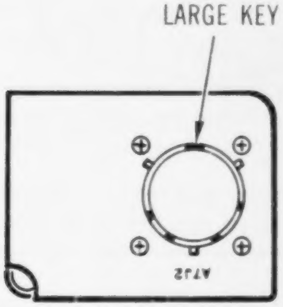
ARR82-25895A

3-56. REPAIR OF TURRET ELECTRICAL COMPONENTS (cont)

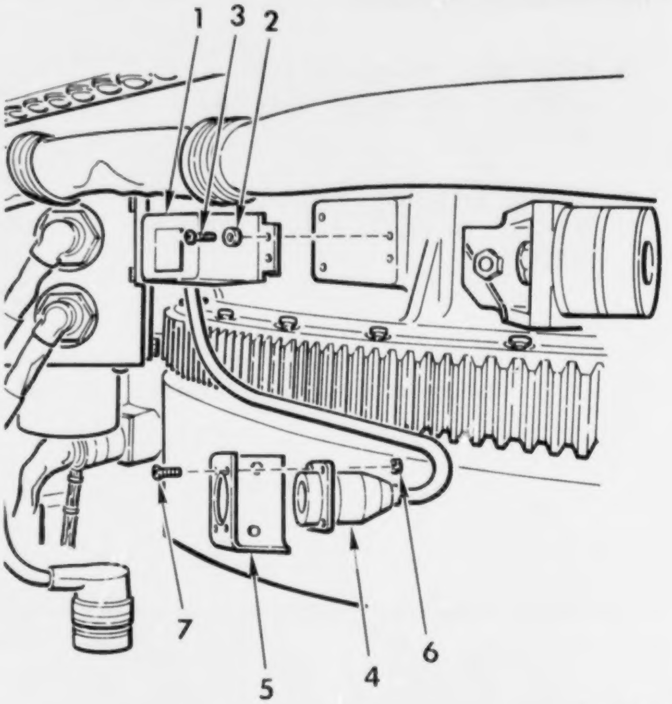
INSTALLATION (cont)

43. INSTALL AZIMUTH BUFFER AMPLIFIER (1) AND SECURE USING FOUR WASHERS (2) AND FOUR SCREWS (3).

44. ORIENT AZIMUTH BUFFER AMPLIFIER CONNECTOR (4) ON CONNECTOR BRACKET (5) AND SECURE USING FOUR NUTS (6) AND FOUR SCREWS (7).



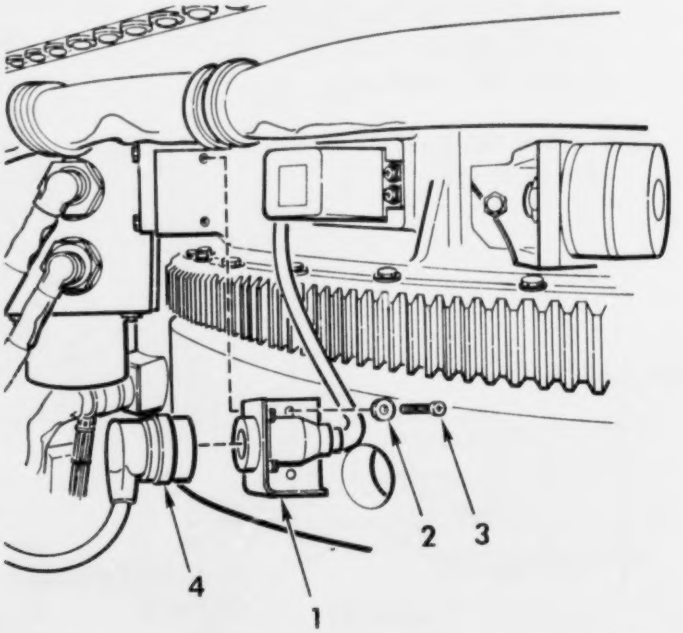
CONNECTOR TO BRACKET ORIENTATION



ARR82-25896A

45. INSTALL CONNECTOR BRACKET (1) AND SECURE USING TWO WASHERS (2) AND TWO SCREWS (3).

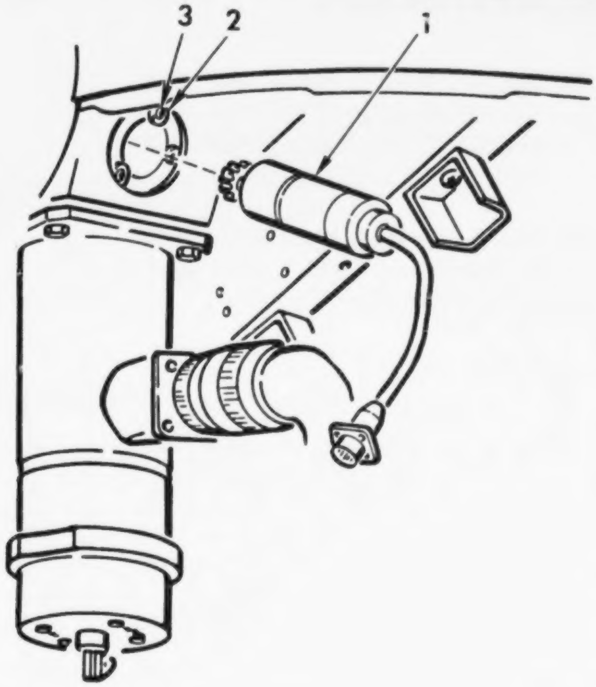
46. CONNECT CONNECTOR W1P5 (4).



ARR82-25897

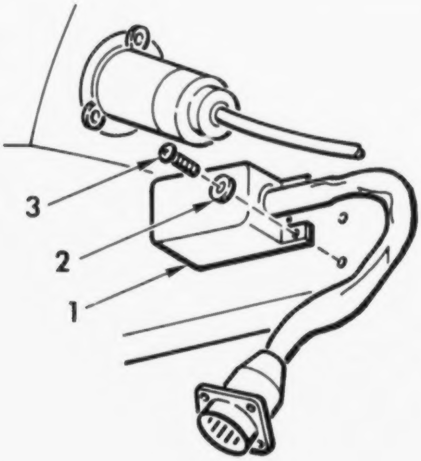
INSTALLATION (cont)

47. INSTALL ELEVATION TACHOMETER (1) AND PIVOT THREE MOUNTING CLAMPS (2) INTO SLOT OF ELEVATION TACHOMETER. TIGHTEN SCREWS (3).



ARR82-25898

48. INSTALL ELEVATION BUFFER AMPLIFIER (1) AND SECURE USING FOUR WASHERS (2) AND FOUR SCREWS (3).



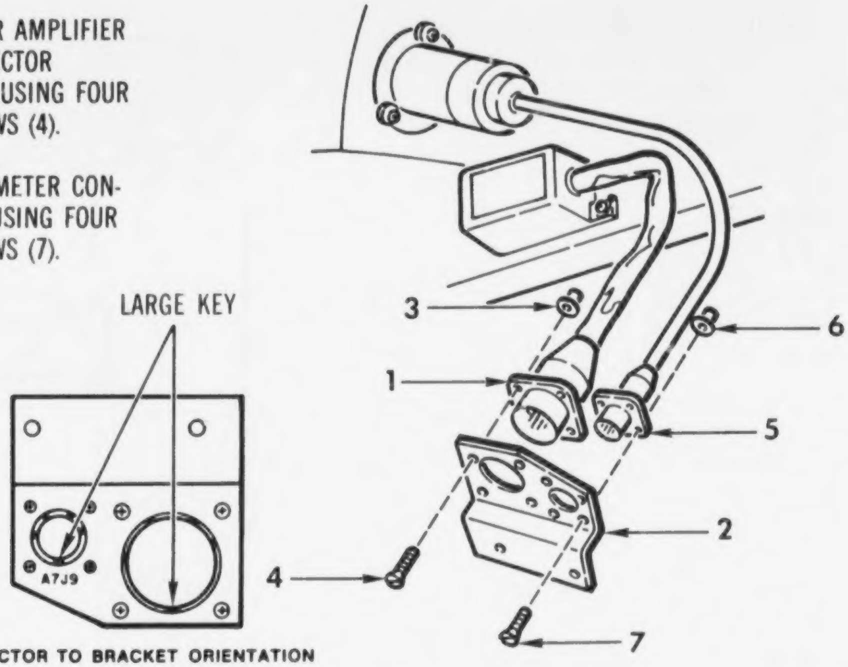
ARR82-25899

3-56. REPAIR OF TURRET ELECTRICAL COMPONENTS (cont)

INSTALLATION (cont)

49. ORIENT ELEVATION BUFFER AMPLIFIER CONNECTOR (1) ON CONNECTOR BRACKET (2) AND SECURE USING FOUR NUTS (3) AND FOUR SCREWS (4).

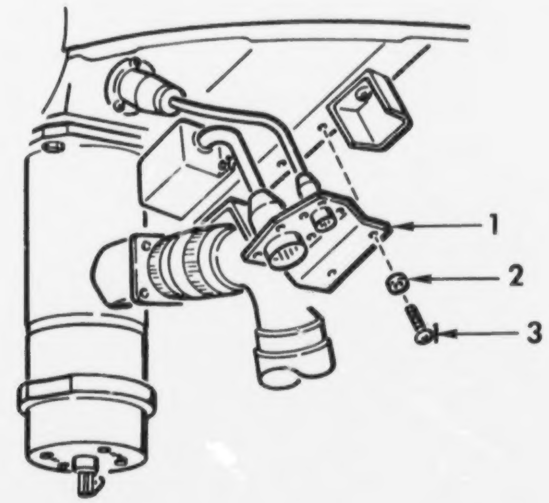
50. ORIENT ELEVATION TACHOMETER CONNECTOR (5) AND SECURE USING FOUR NUTS (6) AND FOUR SCREWS (7).



CONNECTOR TO BRACKET ORIENTATION

ARR82-25900 A

51. INSTALL CONNECTOR BRACKET (1) AND SECURE USING TWO WASHERS (2) AND TWO SCREWS (3).



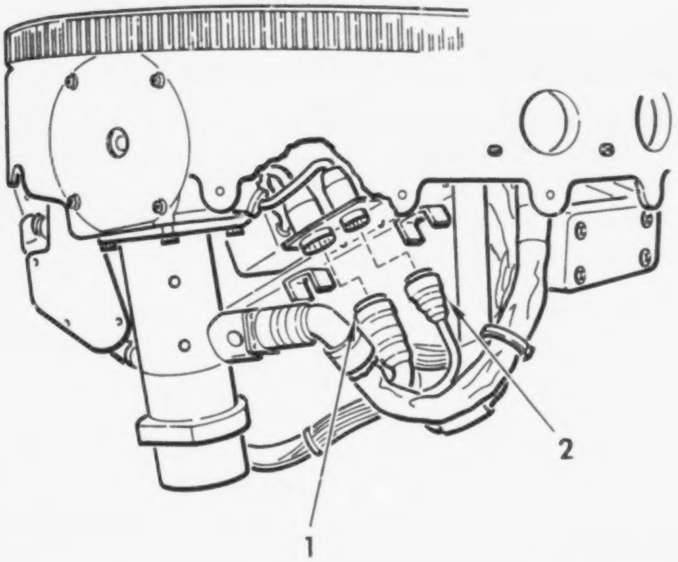
ARR82-25901

INSTALLATION (cont)

52. CONNECT CONNECTOR W1P4 (1).

53. CONNECT CONNECTOR W1P12 (2).

54. NOTIFY NEXT HIGHER MAINTENANCE LEVEL TO ADJUST ELEVATION STOW SWITCH AND ELEVATION PROXIMITY SWITCHES.



ARR82 25902

END OF TASK

3-57. REPAIR OF TURRET AZIMUTH AND ELEVATION MECHANICAL COMPONENTS

DESCRIPTION

This task covers: Removal, cleaning, inspection and installation of proximity switch actuators, azimuth stop mount and cam link spring, roller, and bracket.

INITIAL SETUP

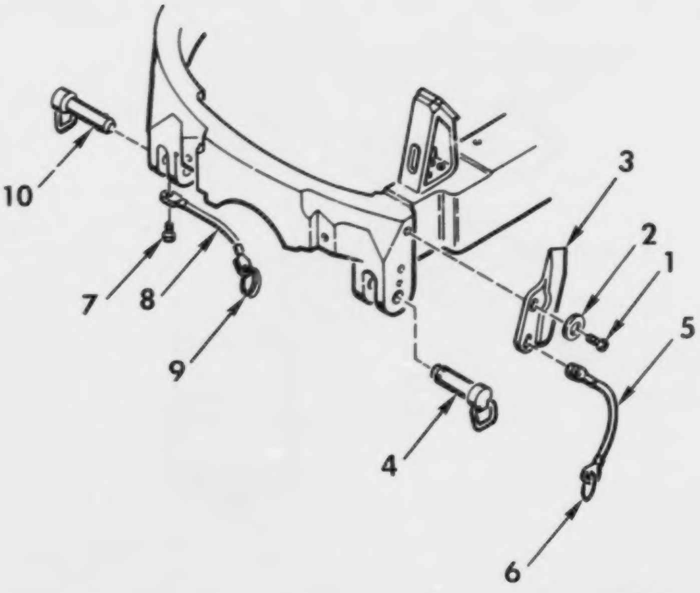
Tools/Test and Support Equipment:
Tool Set, A/C Armament
Repairman: Basic
Tool Set, A/C Armament
Repairman: Supplemental

Personnel Required:
68M Aircraft Weapon Systems Repairer

Equipment Conditions:
HELICOPTER ARMAMENT SUBSYSTEMS MAINTENANCE SETUP performed, para 2-6.
REMOVAL OF M197 GUN performed, para 3-45.

REMOVAL

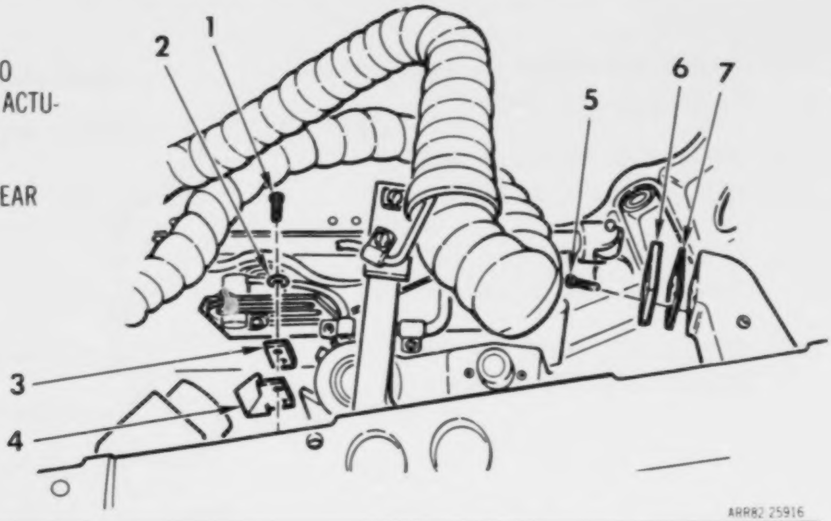
1. REMOVE TWO SCREWS (1), TWO WASHERS (2), AND ELEVATION STOW CAM (3).
2. REMOVE QUICK-RELEASE PIN (4), WIRE ROPE ASSEMBLY (5), AND RING (6).
3. REMOVE SCREW (7), WIRE ROPE ASSEMBLY (8), RING (9), AND QUICK-RELEASE PIN (10).



REMOVAL (cont)

4. REMOVE TWO SCREWS (1), TWO WASHERS (2), PLATE (3), AND ACTUATOR (4).

5. REMOVE FOUR SCREWS (5), WEAR PLATE (6), AND SHIM (7).

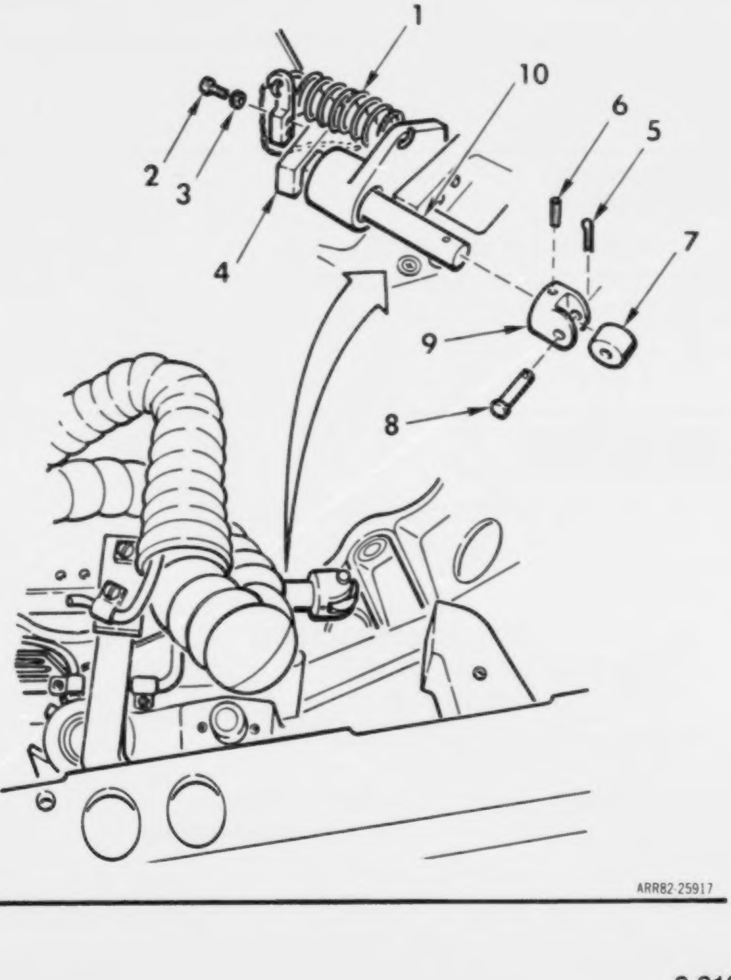

1
2
6
7
5
3
4
ARR82-25916

6. IF NECESSARY, POSITION SADDLE TO REMOVE TENSION FROM SPRING (1).

7. REMOVE LOCKWIRE, TWO SCREWS (2), TWO WASHERS (3), AND BRACKET (4). REMOVE SPRING (1) FROM BRACKET (4) AND TURRET.

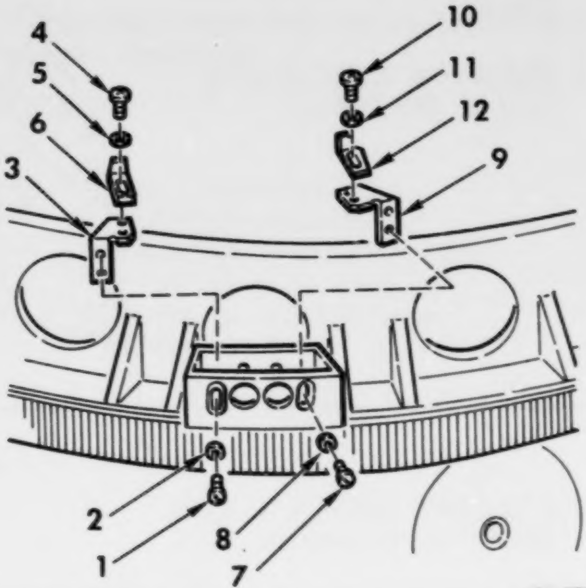
8. REMOVE COTTER PIN (5), STRAIGHT PIN (6), PIN (8), AND ROLLER (7).

9. REMOVE ROLLER SUPPORT (9) FROM SHAFT (10).


1
10
6
5
2
3
7
4
9
8
ARR82-25917

3-57. REPAIR OF TURRET AZIMUTH AND ELEVATION MECHANICAL COMPONENTS (cont)

10. REMOVE TWO SCREWS (1), TWO WASHERS (2), AND BRACKET (3).
11. REMOVE TWO SCREWS (4), TWO WASHERS (5), AND ACTUATOR (6).
12. REMOVE TWO SCREWS (7), TWO WASHERS (8), AND BRACKET (9).
13. REMOVE TWO SCREWS (10), TWO WASHERS (11), AND ACTUATOR (12).



ARR82-25918

CLEANING

14. PERFORM GENERAL CLEANING PROCEDURES IN ACCORDANCE WITH SECTION IV.

INSPECTION

15. PERFORM GENERAL INSPECTION PROCEDURES IN ACCORDANCE WITH SECTION IV.
16. INSPECT PARTS IN ACCORDANCE WITH TABULATED DATA:

Component	Possible Defect	Remedy
Elevation Cam	Cracked or broken	Replace.
	Cam track galled or scored	Replace.

INSPECTION (cont)

Component	Possible Defect	Remedy
Wire Rope Assembly	Damaged or defective	Replace.
Quick-Release Pin	Locking feature defective Damaged or broken	Replace. Replace.
Actuator	Bent or broken	Replace.
Link Return Spring	Deformed	Replace.
Spring Bracket	Cracked or broken	Replace.
Bracket	Bent or broken	Replace.

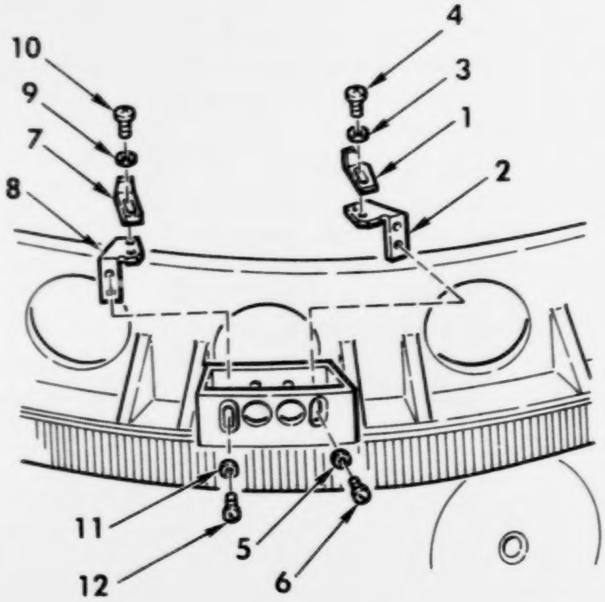
INSTALLATION

17. INSTALL ACTUATOR (1) ON BRACKET (2) AND SECURE USING TWO WASHERS (3) AND TWO SCREWS (4).

18. INSTALL BRACKET (2) AND SECURE USING TWO WASHERS (5) AND TWO SCREWS (6).

19. INSTALL ACTUATOR (7) ON BRACKET (8) AND SECURE USING TWO WASHERS (9) AND TWO SCREWS (10).

20. INSTALL BRACKET (8) AND SECURE USING TWO WASHERS (11) AND TWO SCREWS (12).



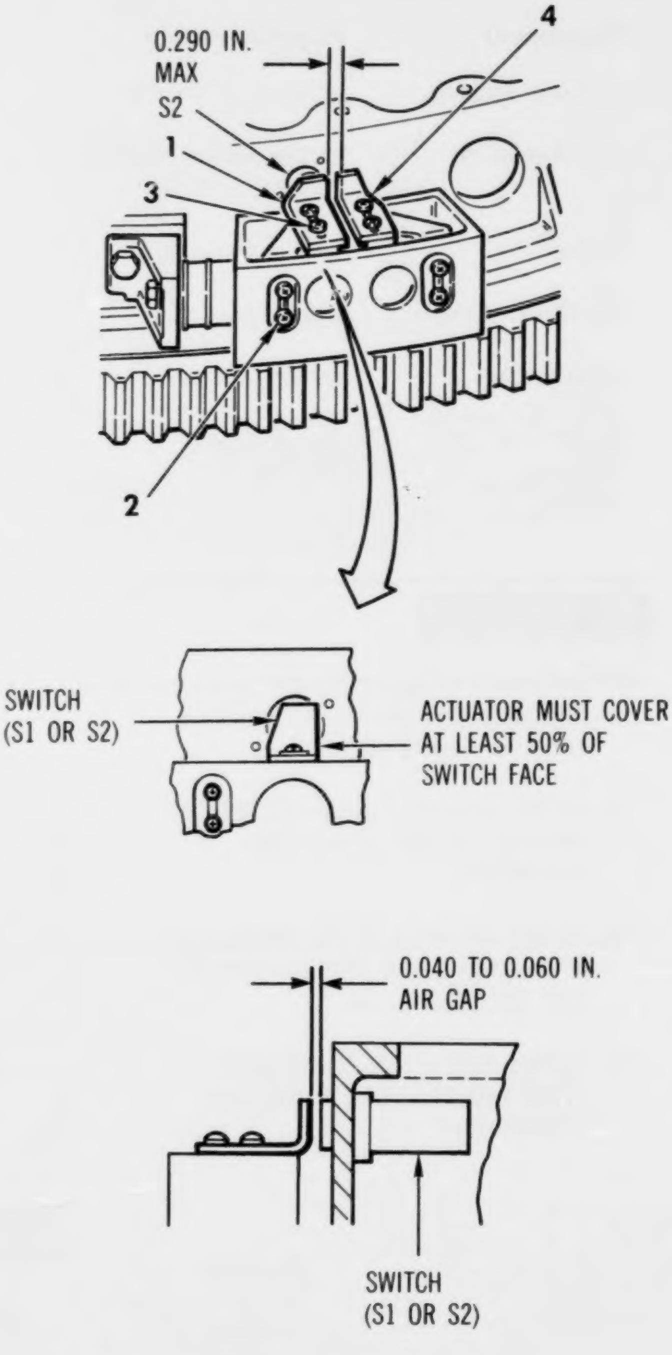
ARR82-25919

3-57. REPAIR OF TURRET AZIMUTH AND ELEVATION MECHANICAL COMPONENTS (cont)

NOTE

Space limitations prevent direct adjustment of actuator for azimuth proximity switch S1.

21. PERFORM PRELIMINARY ADJUSTMENT OF AZIMUTH ACTUATORS
    a. Rotate turret in right azimuth until actuator (1) is in line with azimuth proximity switch S2.
    b. Loosen two screws (2) and move actuator (1) vertically until it covers at least 50 percent of face of azimuth proximity switch. Tighten two screws (2).
    c. Loosen two screws (3) and move actuator (1) laterally to obtain an air gap of 0.040 to 0.060 inch between end of actuator and face of azimuth proximity switch. Tighten two screws (3).
    d. Repeat steps (b) and (c) and adjust position of actuator (4) to image position of actuator (1). Do not exceed 0.290 inch spacing between actuators.
    e. Carefully rotate turret in left azimuth until actuator (4) is in line with azimuth proximity switch S1. Visually check actuator face coverage and air gap. Readjust actuator (4) as required.

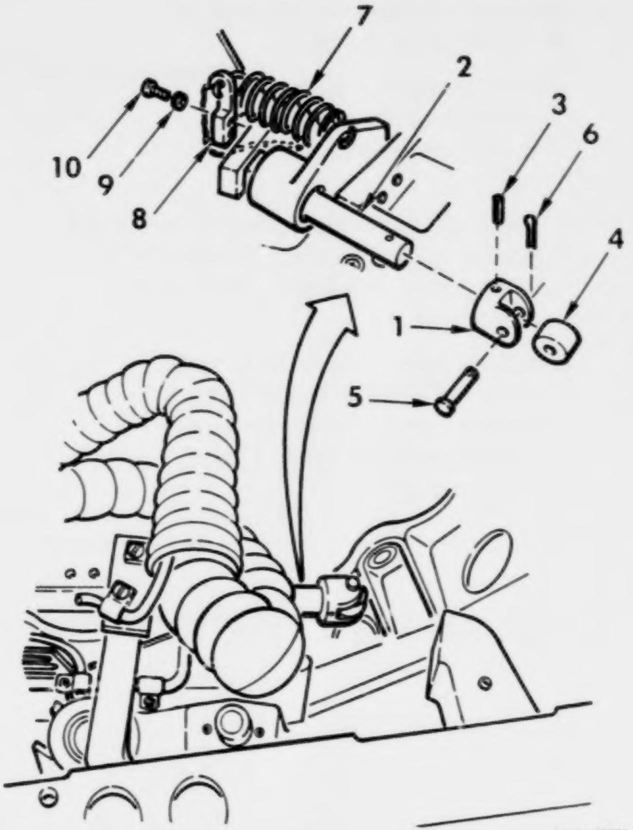

0.290 IN.
MAX
4
S2
1
3
2
SWITCH
(S1 OR S2)
ACTUATOR MUST COVER
AT LEAST 50% OF
SWITCH FACE
0.040 TO 0.060 IN.
AIR GAP
SWITCH
(S1 OR S2)
ARR82-25920

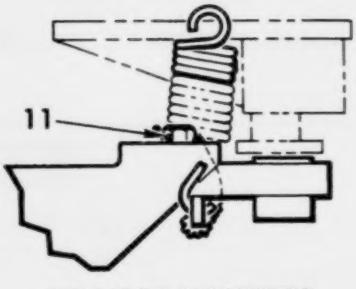
INSTALLATION (cont)

22. POSITION ROLLER SUPPORT (1) ON SHAFT (2) AND SECURE WITH PIN (3).

23. POSITION ROLLER (4) IN ROLLER SUPPORT (1) AND INSTALL STRAIGHT PIN (5) AND COTTER PIN (6).

24. INSTALL SPRING (7) TO TURRET AND BRACKET (8). SECURE BRACKET USING TWO WASHERS (9) AND TWO SCREWS (10). LOCKWIRE BRACKET TO PRELOAD BOLT (11).



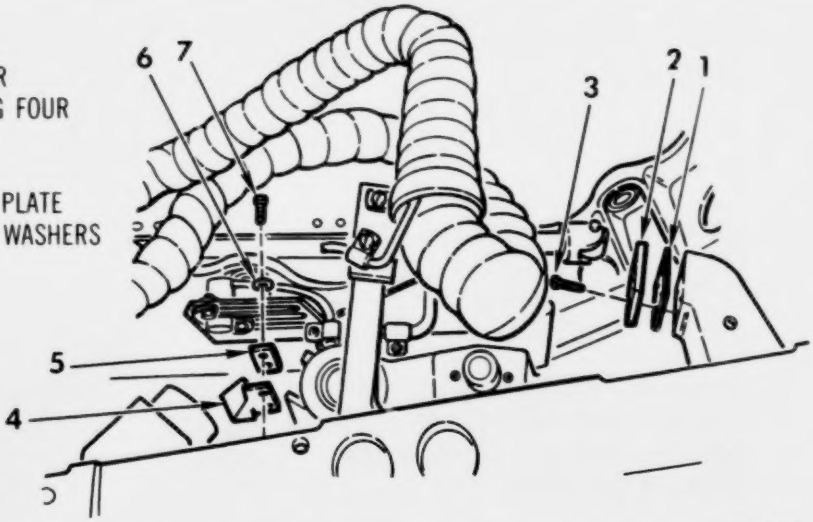


PRELOAD BOLT LOCKWIRING

ARR82 25921

25. POSITION SHIM (1) AND WEAR PLATE (2) AND SECURE USING FOUR SCREWS (3).

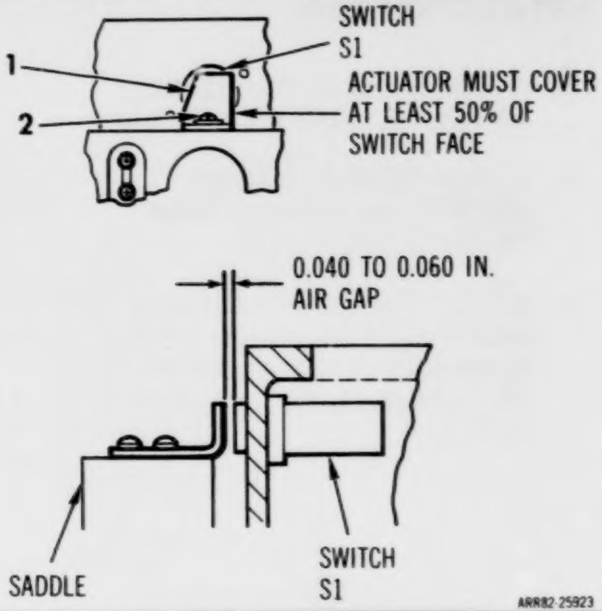
26. POSITION ACTUATOR (4) AND PLATE (5), AND SECURE USING TWO WASHERS (6) AND TWO SCREWS (7).



ARR82-25922

3-57. REPAIR OF TURRET AZIMUTH AND ELEVATION MECHANICAL COMPONENTS (cont)

27. PERFORM PRELIMINARY ADJUSTMENT OF ELEVATION ACTUATOR.
    a. Place saddle in a down elevation position until the actuator (1) is in line with elevation proximity switch S1.
    b. Loosen two screws (2) and adjust actuator (1) until it covers at least 50 percent of face of elevation proximity switch.
    c. Laterally adjust actuator (1) to obtain an air gap of 0.040 to 0.060 inch between end of actuator and face of elevation proximity switch. Tighten two screws (2).


SWITCH S1
1
2
ACTUATOR MUST COVER AT LEAST 50% OF SWITCH FACE
0.040 TO 0.060 IN. AIR GAP
SADDLE
SWITCH S1
ARR82-25923

28. INSTALL RING (1) ON WIRE ROPE ASSEMBLY (2).

29. INSTALL QUICK-RELEASE PIN BAIL (3) ON RING (1).

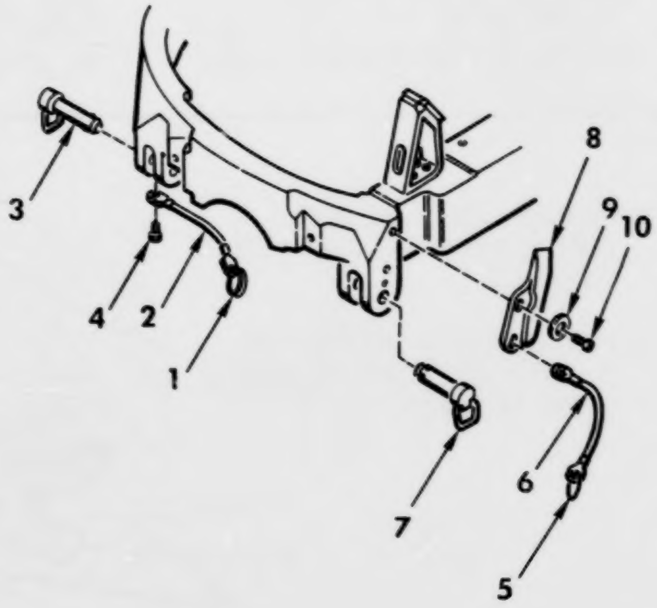
30. INSTALL WIRE ROPE ASSEMBLY (2) AND SECURE USING SCREW (4).

31. INSTALL RING (5) ON WIRE ROPE ASSEMBLY (6).

32. INSTALL QUICK-RELEASE PIN BAIL (7) ON RING (5)

33. INSTALL ELEVATION STOW CAM (8) AND WIRE ROPE ASSEMBLY (6) AND SECURE USING TWO WASHERS (9) AND TWO SCREWS (10).

34. NOTIFY NEXT HIGHER MAINTENANCE LEVEL TO ADJUST AZIMUTH AND ELEVATION PROXIMITY SWITCHES AND ELEVATION MECHANICAL STOP.


8
9
10
3
4
2
1
7
6
5
ARR82-25924

END OF TASK

3-58. REPAIR OF CABLE MOUNTING HARDWARE

DESCRIPTION

This task covers: Removal, cleaning, inspection, and installation.

INITIAL SETUP

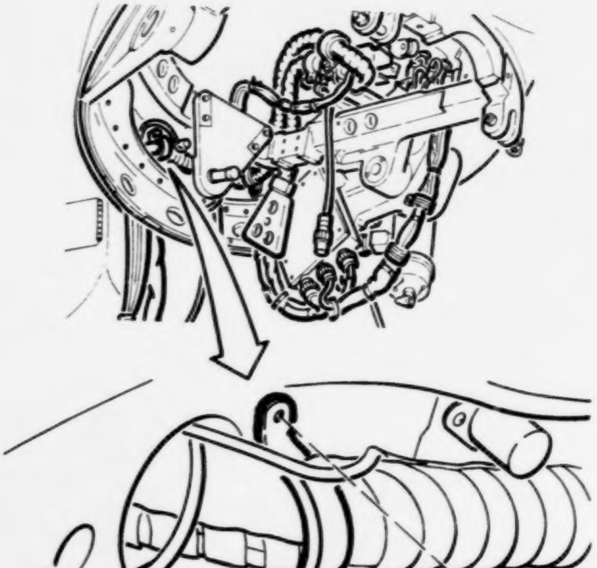
Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental

Personnel Required:
  68J Aircraft Fire Control Repairer/
  68M Aircraft Weapon Systems Repairer

Equipment Conditions:
  REMOVAL OF M197 GUN
  performed, para 3-45.

REMOVAL

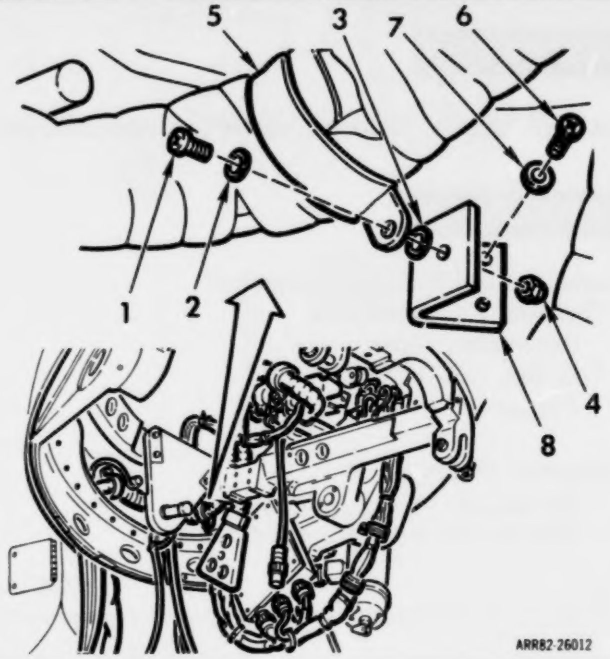
1. REMOVE SCREW (1), WASHER (2), AND LOOP CLAMP (3).



3-58. REPAIR OF CABLE MOUNTING HARDWARE (cont)

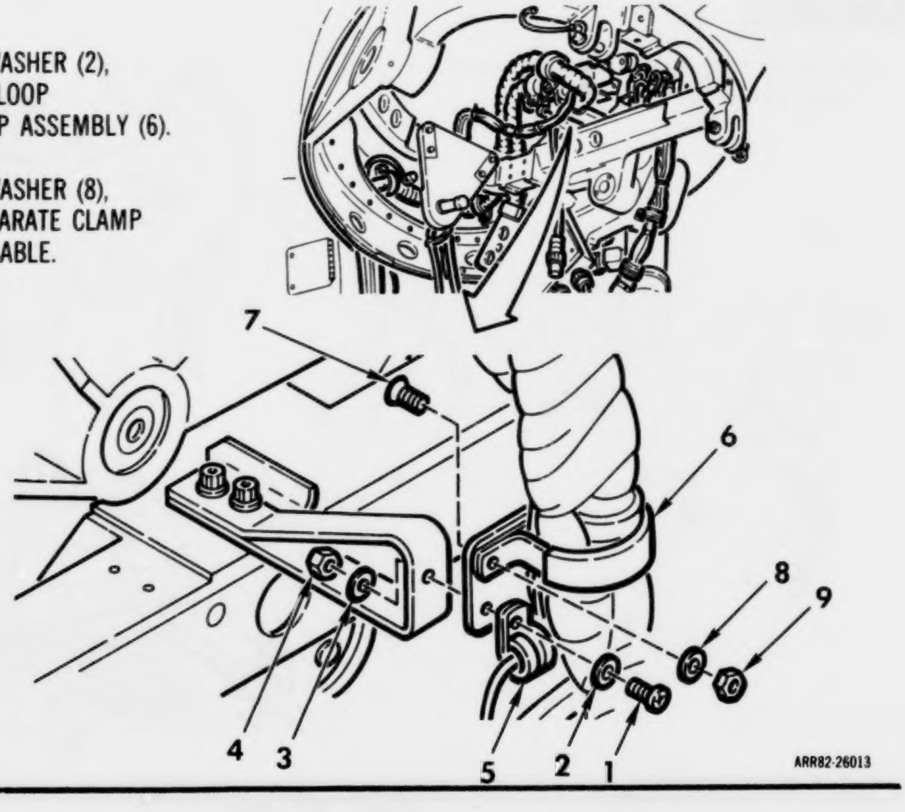
2. REMOVE SCREW (1), WASHER (2), WASHER (3), NUT (4), AND LOOP CLAMP (5).

3. REMOVE TWO SCREWS (6), TWO WASHERS (7), AND BRACKET (8).


5
3
7
6
1
2
4
8
ARR82-26012

4. REMOVE SCREW (1), WASHER (2), WASHER (3), NUT (4), LOOP CLAMP (5), AND CLAMP ASSEMBLY (6).

5. REMOVE SCREW (7), WASHER (8), AND NUT (9) AND SEPARATE CLAMP ASSEMBLY (6) FROM CABLE.


7
6
8
9
4
3
5
2
1
ARR82-26013

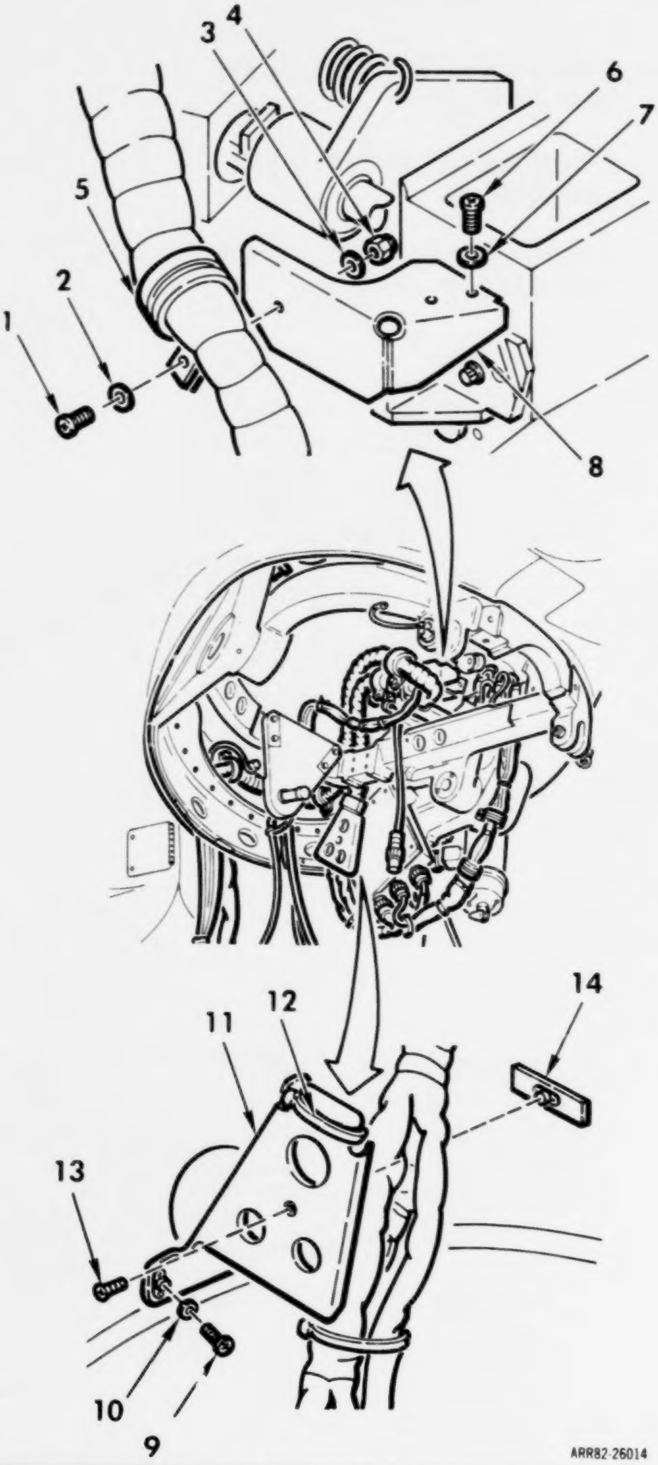
REMOVAL (cont)

6. REMOVE SCREW (1), WASHER (2), WASHER (3), NUT (4), AND LOOP CLAMP (5).

7. REMOVE TWO SCREWS (6), TWO WASHERS (7), AND BRACKET (8).

8. REMOVE TWO SCREWS (9), TWO WASHERS (10) AND SEPARATE BRACKET ASSEMBLY (11) FROM TURRET.

9. REMOVE CABLE TIEDOWN STRAP (12), SCREW (13), CLAMP (14), AND BRACKET ASSEMBLY (11) FROM CABLING.



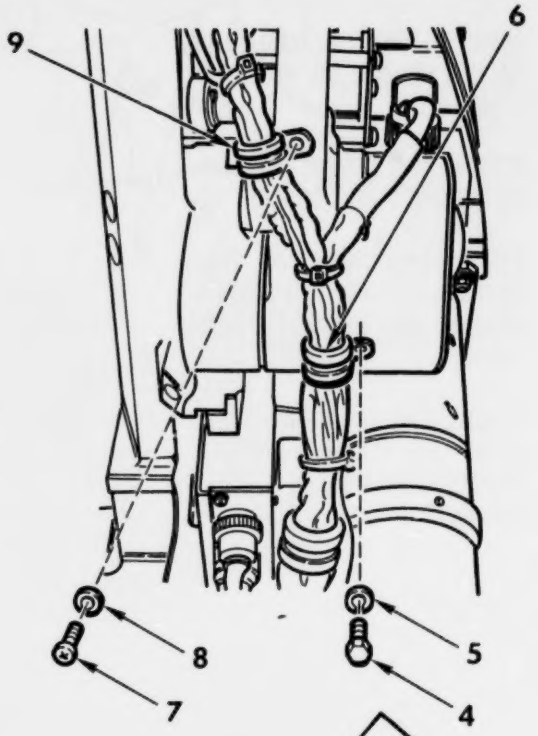
ARR82-26014

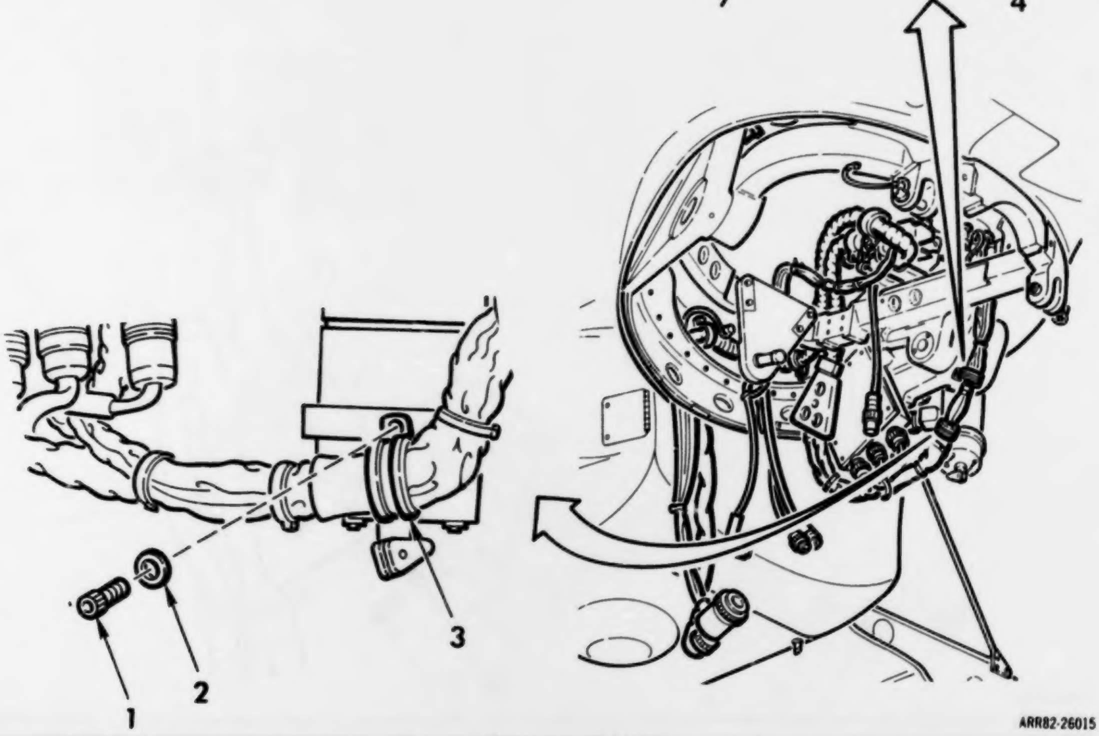
3-58. REPAIR OF CABLE MOUNTING HARDWARE (cont)

10. REMOVE SCREW (1), WASHER (2), AND LOOP CLAMP (3).

11. REMOVE BOLT (4), WASHER (5), AND LOOP CLAMP (6).

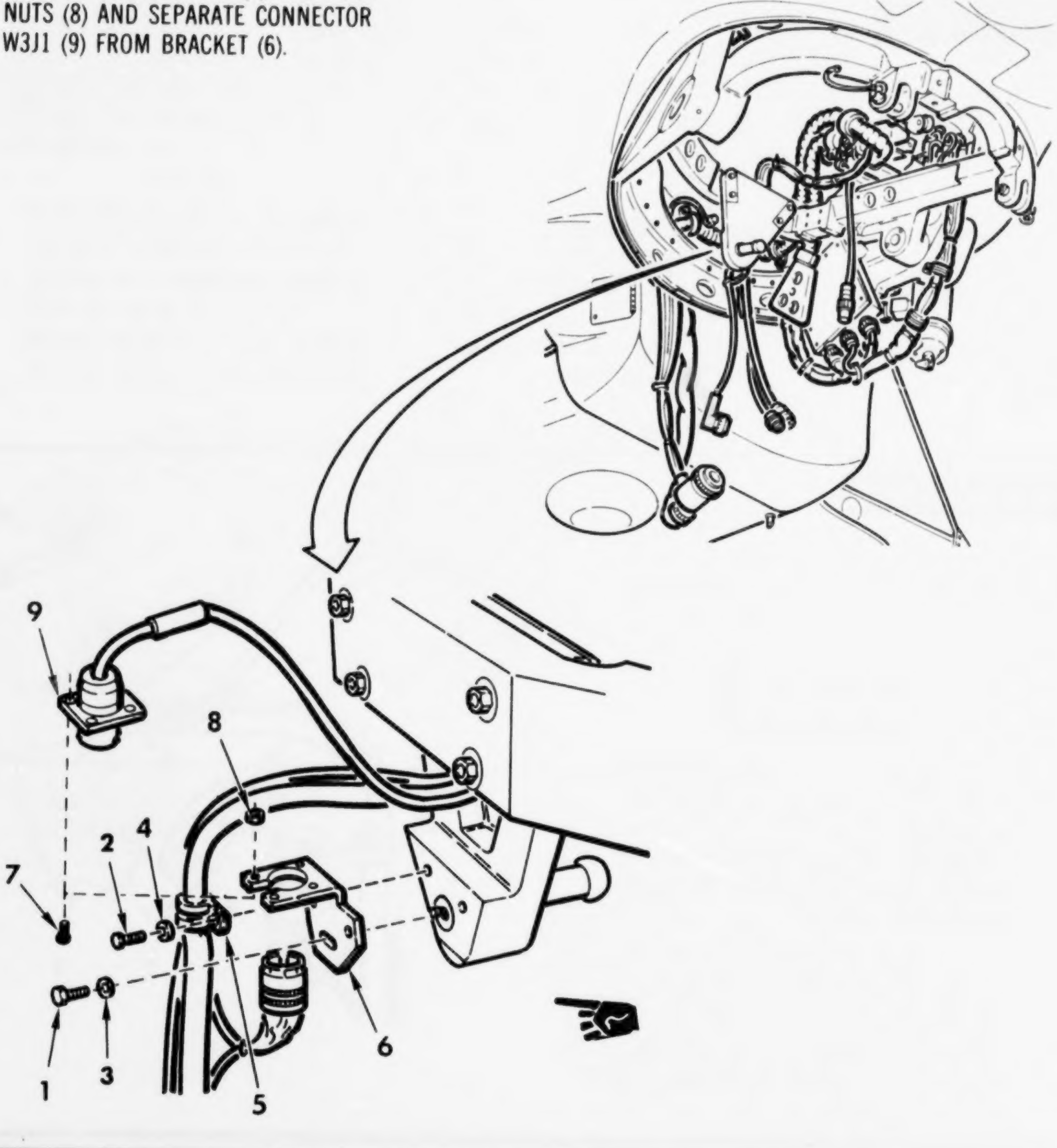
12. REMOVE SCREW (7), WASHER (8), AND LOOP CLAMP (9).




3
2
1
ARR82-26015

REMOVAL (cont)

13. REMOVE LOCKWIRE FROM BOLT (1) AND TWO BOLTS (2). REMOVE BOLT (1), WASHER (3), TWO BOLTS (2), TWO WASHERS (4), LOOP CLAMP (5) AND BRACKET (6).
14. REMOVE FOUR SCREWS (7) AND FOUR NUTS (8) AND SEPARATE CONNECTOR W3J1 (9) FROM BRACKET (6).



3-58. REPAIR OF CABLE MOUNTING HARDWARE (cont)

CLEANING

15. PERFORM GENERAL CLEANING PROCEDURES IN ACCORDANCE WITH SECTION IV.

INSPECTION

16. PERFORM GENERAL INSPECTION PROCEDURES IN ACCORDANCE WITH SECTION IV AND TABULATED DATA.

Component	Possible Defect	Remedy
Mounting Brackets	Bent, cracked, broken	Straighten or replace.
Loop Clamps	Rubber cracked or deteriorated Bent, cracked, broken	Replace. Replace.

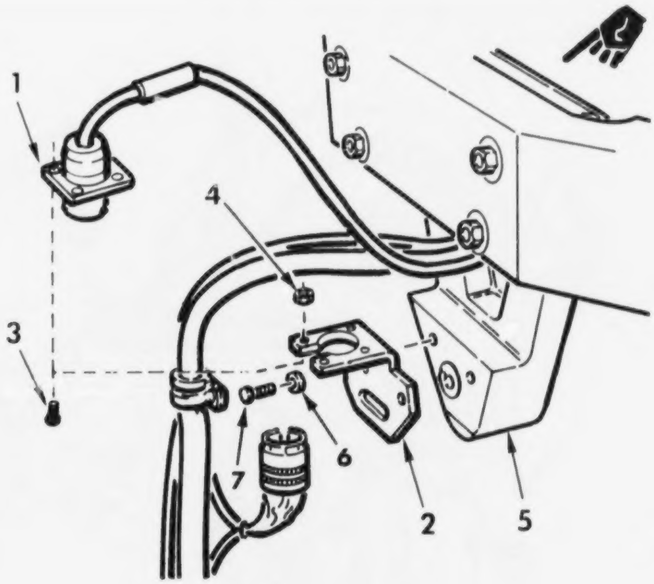
INSTALLATION

17. INSTALL CONNECTOR W3J1 (1) ON BRACKET (2) AND SECURE WITH FOUR SCREWS (3) AND FOUR NUTS (4).

WARNING

Failure to perform the following procedure exactly as specified could result in ball mount coming loose which would cause the gun to become unstable about its horizontal axis.

18. INSTALL BRACKET (2) TO REAR SUPPORT (5) AND SECURE WITH TWO WASHERS (6) AND TWO BOLTS (7). DO NOT INSTALL LOOP CLAMP AT THIS TIME AND DO NOT TIGHTEN BOLT WHICH WILL HOLD LOOP CLAMP.

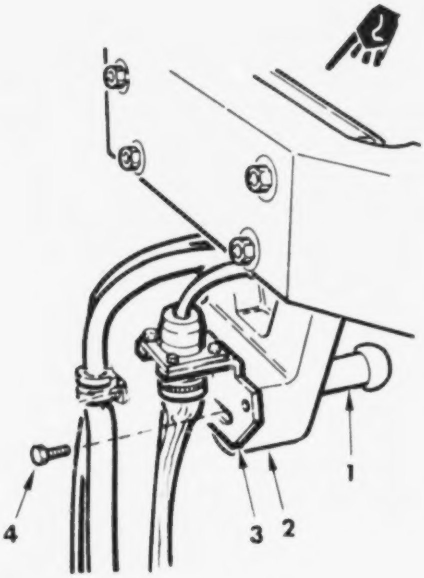


INSTALLATION (cont)

NOTE

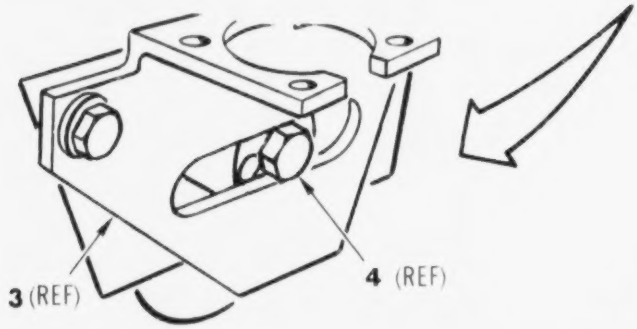
Pin must be removed from ball mount (1) before performing the following procedure.

19. INSTALL BALL MOUNT (1) INTO REAR SUPPORT (2) SO THE CENTER HOLE AND THE PIN HOLE ARE ALINED WITH THE SLOT IN BRACKET (3). TEMPORARILY RETAIN BALL MOUNT (1) WITH BOLT (4) WITHOUT A WASHER. TIGHTEN BOLT ONLY FINGERTIGHT.

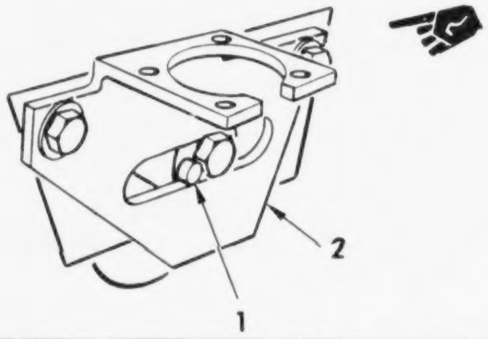


NOTE

Bolt (4) should be installed so that a flat on the head of the bolt is adjacent to the pin hole in the ball mount and not obstructing access to the pin hole.



20. INSTALL PIN (1) SO IT PROJECTS THROUGH BRACKET (2) AND IT IS JUST FLUSH WITH THE OUTER SURFACE OF THE BRACKET.

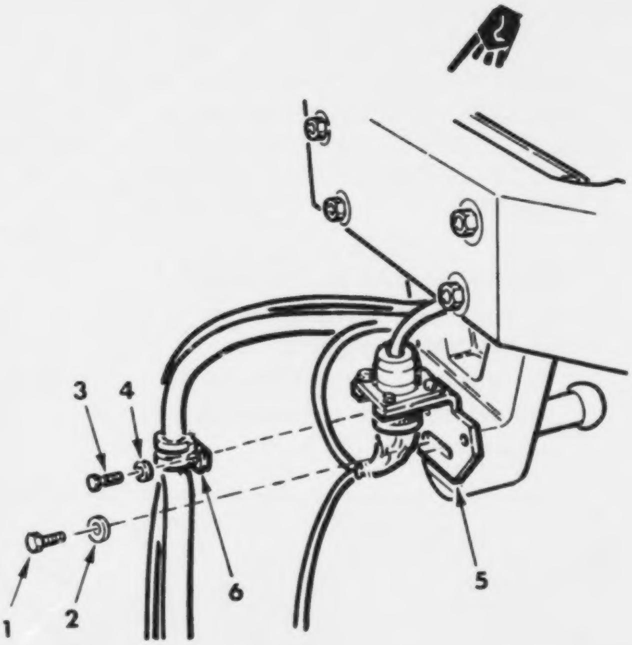


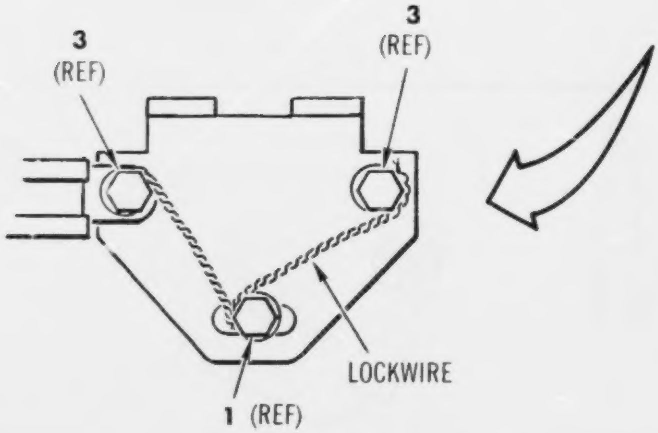
3-58. REPAIR OF CABLE MOUNTING HARDWARE (cont)

20.1 REMOVE BOLT (1) AND REINSTALL WITH WASHER (2). TORQUE BOLT (1) TO 130 TO 140 LB-IN. (14.62-15.74 N.M).

20.2 REMOVE BOLT (3) AND WASHER (4) FROM LEFT-HAND MOUNTING HOLE OF BRACKET (5). POSITION LOOP CLAMP (6) ON LEFT-HAND MOUNTING HOLE OF BRACKET (5). SECURE WITH WASHER (4) AND BOLT (3).

20.3 SAFETY WIRE TWO BOLTS (3) AND BOLT (1) AS SHOWN TO PREVENT MOVEMENT.



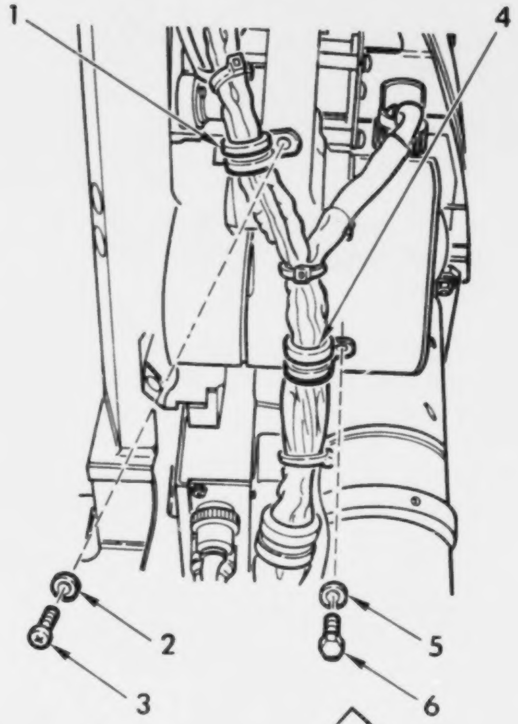


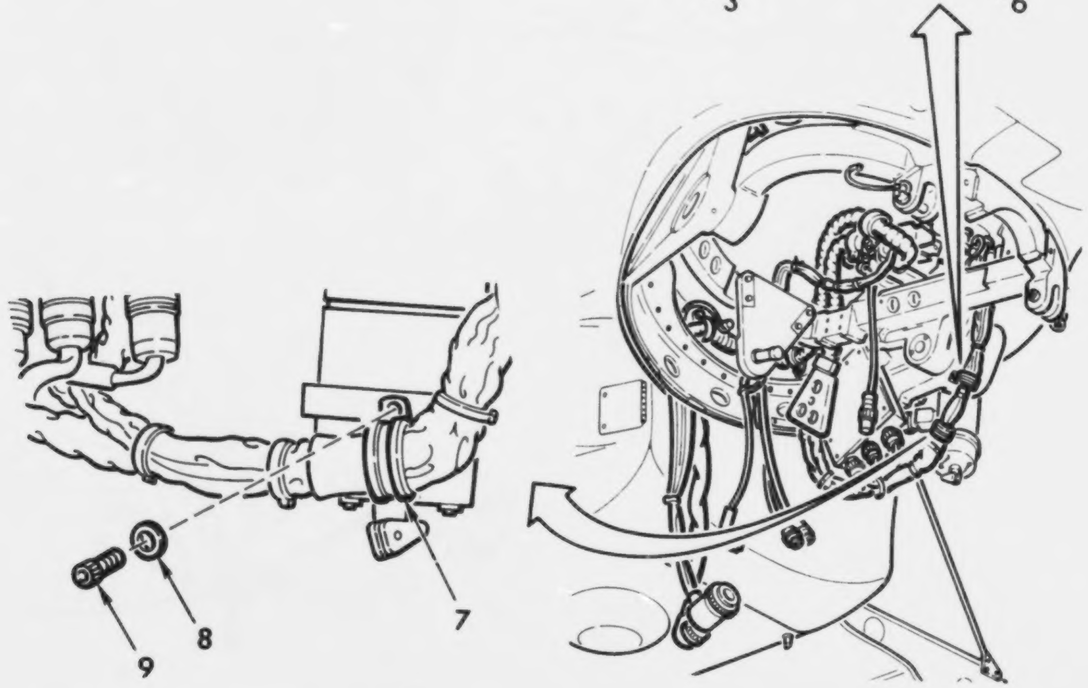
INSTALLATION (cont)

21. INSTALL LOOP CLAMP (1) AND SECURE USING WASHER (2) AND SCREW (3).

22. INSTALL LOOP CLAMP (4) AND SECURE USING WASHER (5) AND BOLT (6).

23. INSTALL LOOP CLAMP (7) AND SECURE USING WASHER (8) AND SCREW (9).





ARR82-26018

3-58. REPAIR OF CABLE MOUNTING HARDWARE (cont)

24. INSTALL BRACKET ASSEMBLY (1) ON CABLING.

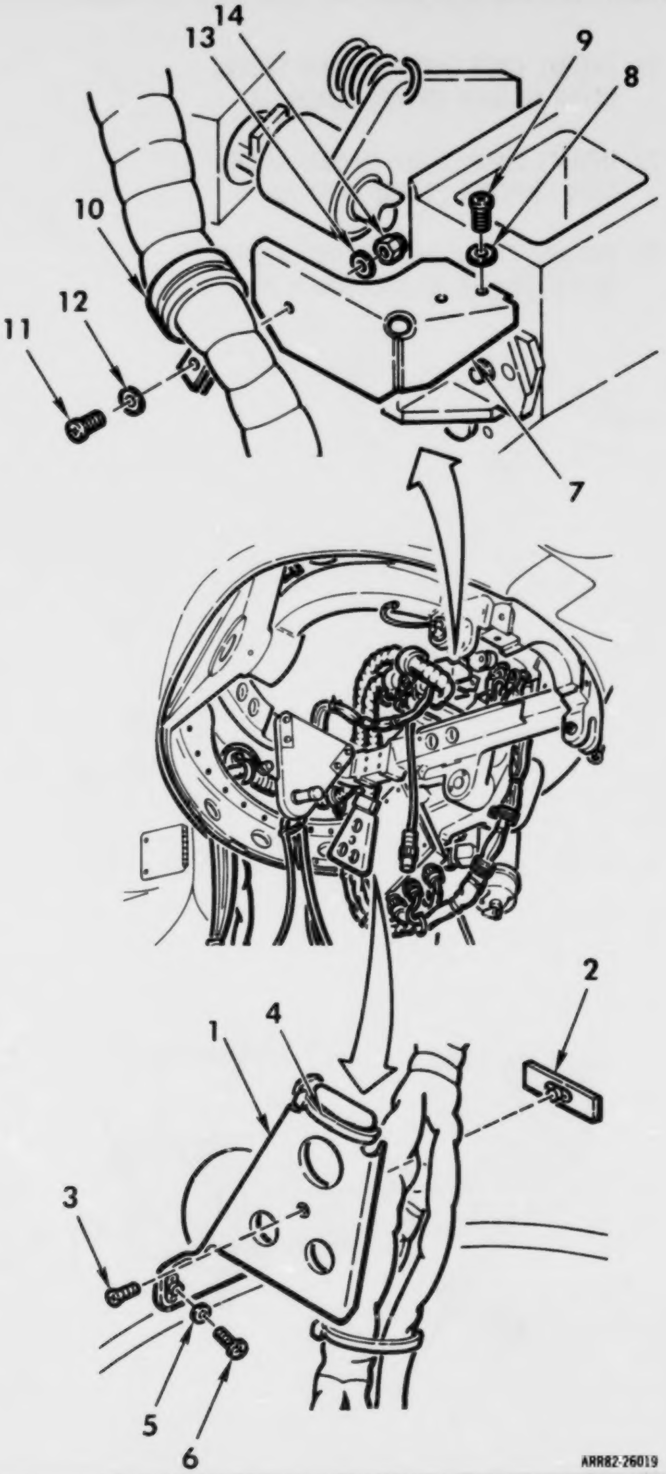
25. INSTALL CLAMP (2) AND SECURE USING SCREW (3).

26. INSTALL CABLE TIEDOWN STRAP (4) AROUND BRACKET ASSEMBLY (1) AND CABLING.

27. INSTALL BRACKET ASSEMBLY (1) ON TURRET AND SECURE USING TWO WASHERS (5) AND TWO SCREWS (6).

28. INSTALL BRACKET (7) AND SECURE USING TWO WASHERS (8) AND TWO SCREWS (9).

29. INSTALL LOOP CLAMP (10) AND SECURE USING SCREW (11), WASHER (12), WASHER (13), AND NUT (14).

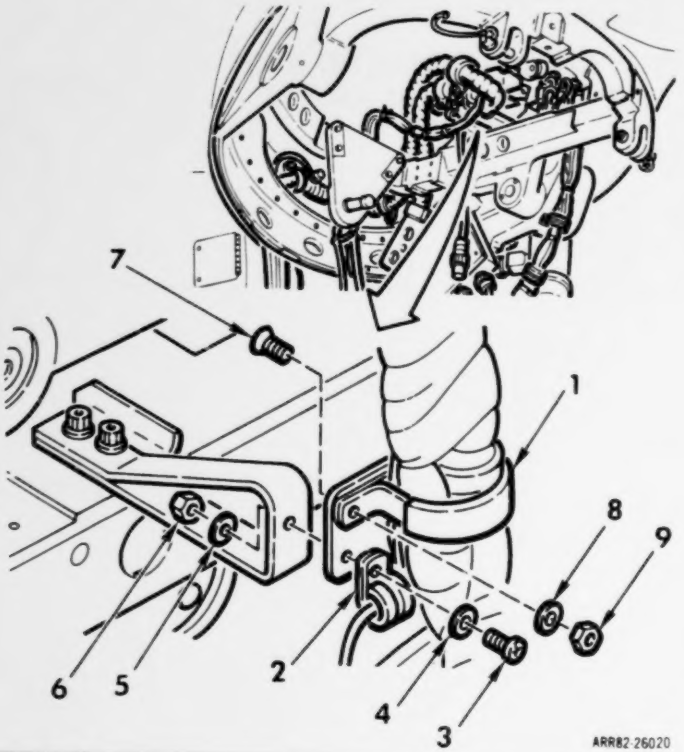


INSTALLATION (cont)

30. POSITION CLAMP ASSEMBLY (1) ON CABLE.

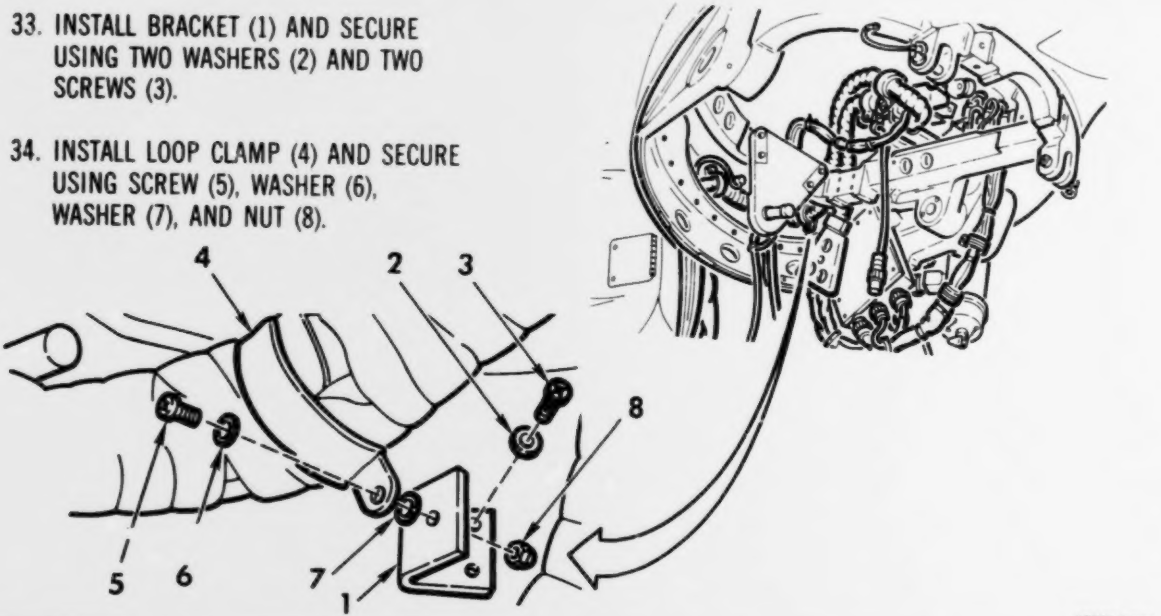
31. INSTALL CLAMP ASSEMBLY (1) AND LOOP CLAMP (2) AND SECURE USING SCREW (3), WASHER (4), WASHER (5), AND NUT (6).

32. INSTALL SCREW (7), WASHER (8), AND NUT (9).


7
1
8
9
6
5
2
4
3
ARR82-26020

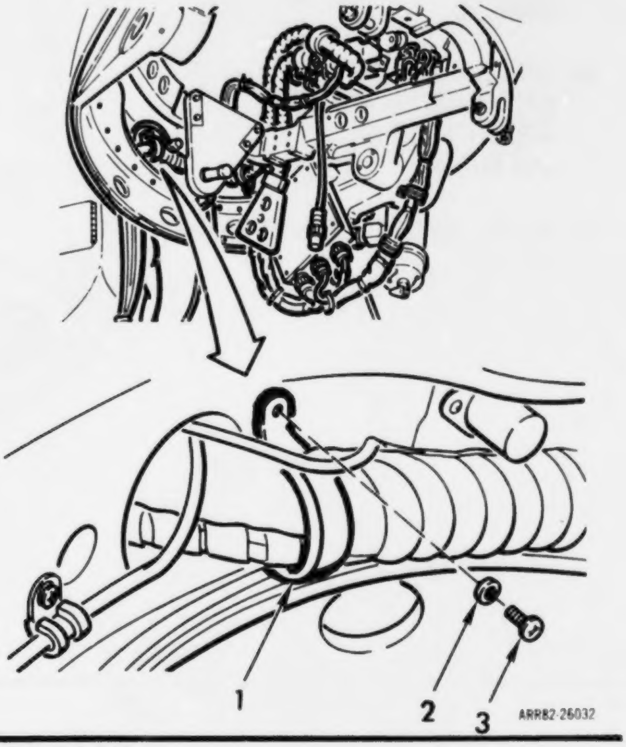
33. INSTALL BRACKET (1) AND SECURE USING TWO WASHERS (2) AND TWO SCREWS (3).

34. INSTALL LOOP CLAMP (4) AND SECURE USING SCREW (5), WASHER (6), WASHER (7), AND NUT (8).


4
2
3
8
5
6
7
1
ARR82-26031

3-58. REPAIR OF CABLE MOUNTING HARDWARE (cont)

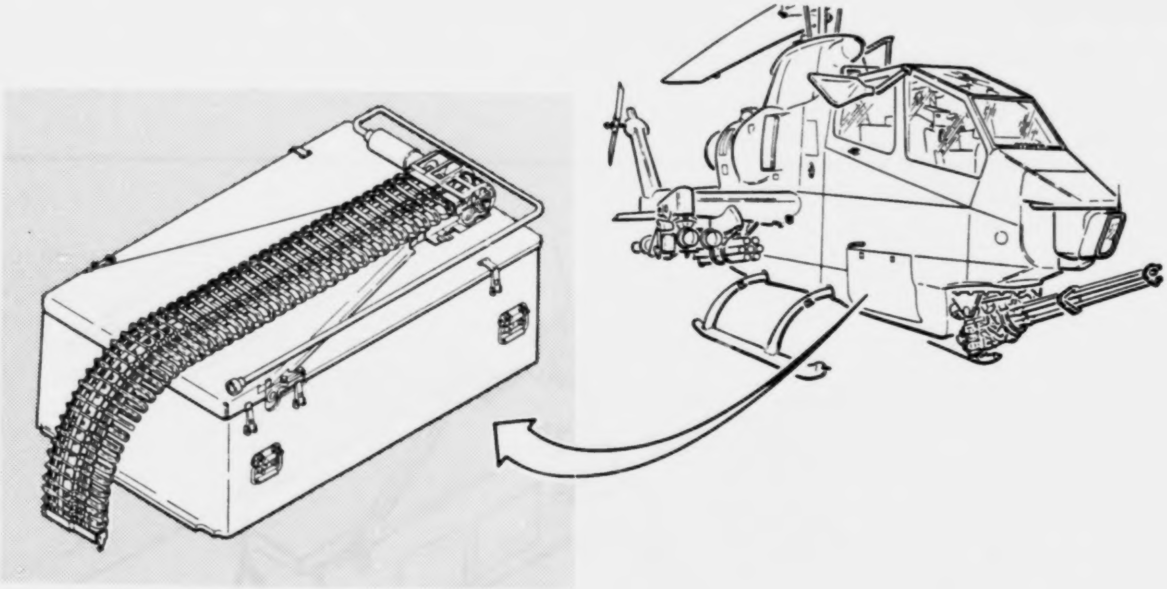
35. INSTALL LOOP CLAMP (1) AND SECURE USING WASHER (2) AND SCREW (3).


1
2
3
ARR82-26032

END OF TASK

Section XII. MAINTENANCE OF AMMUNITION FEED SYSTEM

Section Contents	Para
Removal/Installation of Ammunition Feed System	3-59
Repair of Ammunition Box	3-60
Repair of Cover Assembly	3-61
Repair of Booster	3-62
Repair of Feed Chute	3-63



3-59. REMOVAL/INSTALLATION OF AMMUNITION FEED SYSTEM

DESCRIPTION

This task covers: Removal, inspection, and installation.

INITIAL SETUP

Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental

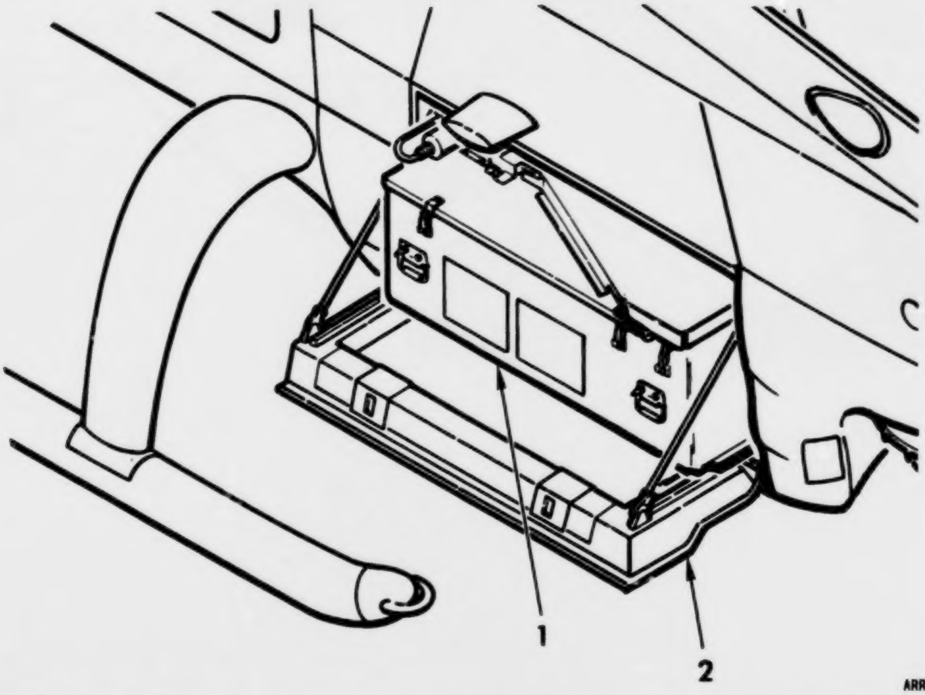
Personnel Required:
  68M Aircraft Weapon Systems
    Repairer (2)

Equipment Conditions:
  HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SET-UP performed, para 2-6.
  Left and right ammunition bay doors open.

REMOVAL

1. REMOVE AMMUNITION BOX (1).

   Remove two quick-release pins securing ammunition box (1) and pull ammunition box out of bay and onto right ammunition bay door (2).

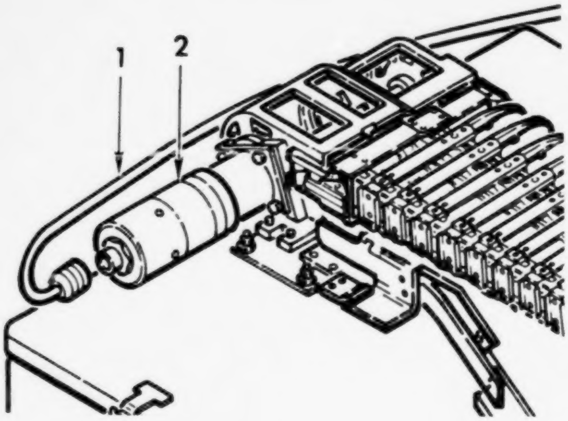


ARR82-27568

REMOVAL (cont)

2. DISCONNECT CABLE W1 (1).

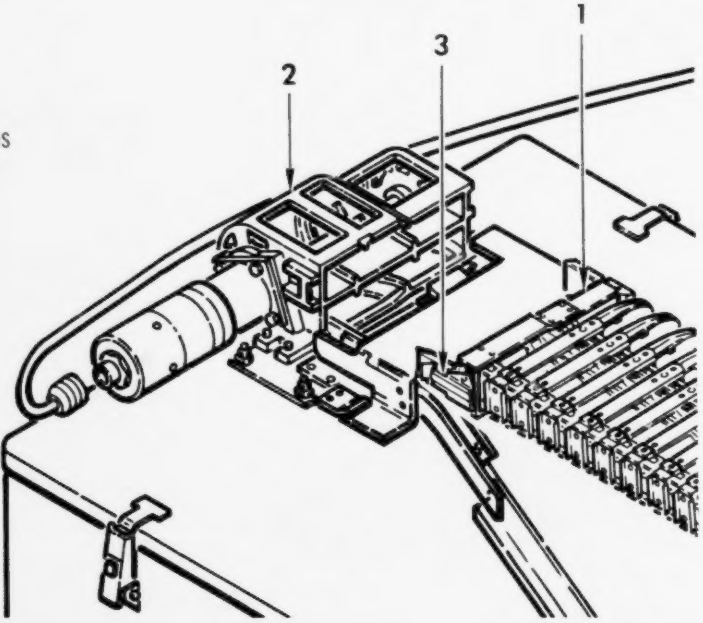
Disconnect cable W1 (1) from booster motor (2).



ARR82-27569

3. DISCONNECT FEED CHUTE (1) FROM BOOSTER (2).

Disconnect feed chute (1) from booster (2) by depressing two clips (3) and pulling chute free from booster.

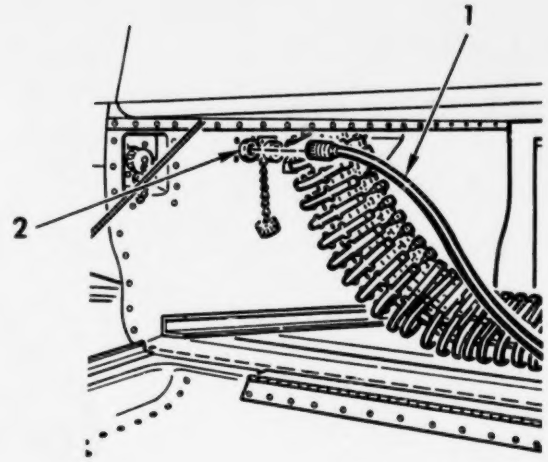


ARR82-27570

3-59. REMOVAL/INSTALLATION OF AMMUNITION FEED SYSTEM (cont)

4. DISCONNECT CABLE W1 (1).

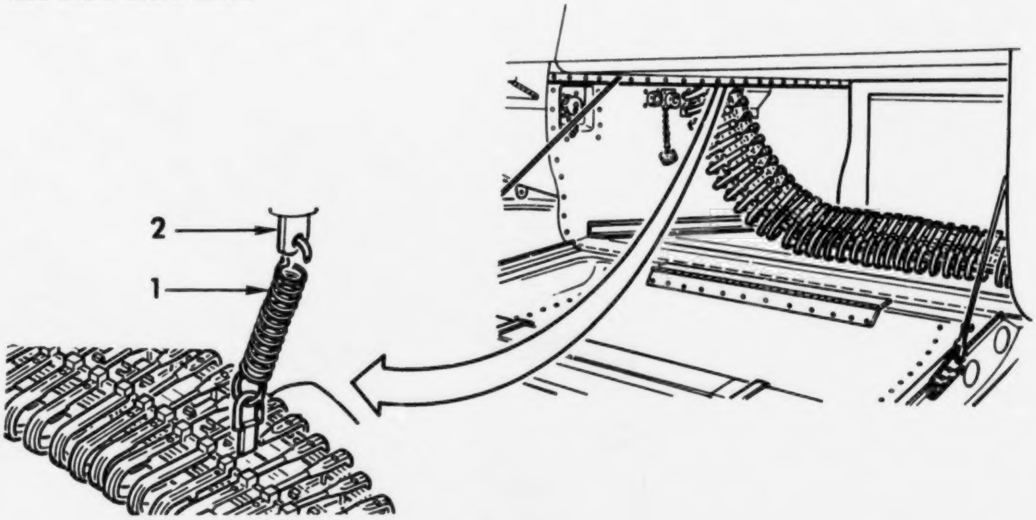
Disconnect cable W1 (1) from connector 19B1J1 (2) on forward bulkhead of ammunition bay.



ARR82-27571

5. DISCONNECT SPRING (1).

Disconnect spring (1) from D-ring (2) on feed chute above turret.

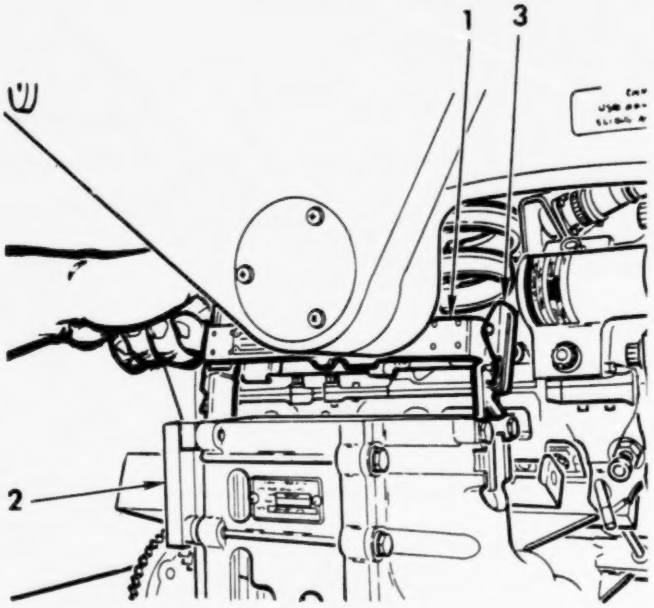


ARR82-27572

REMOVAL (cont)

6. DISCONNECT FEED CHUTE (1) FROM M89E1 FEEDER (2).

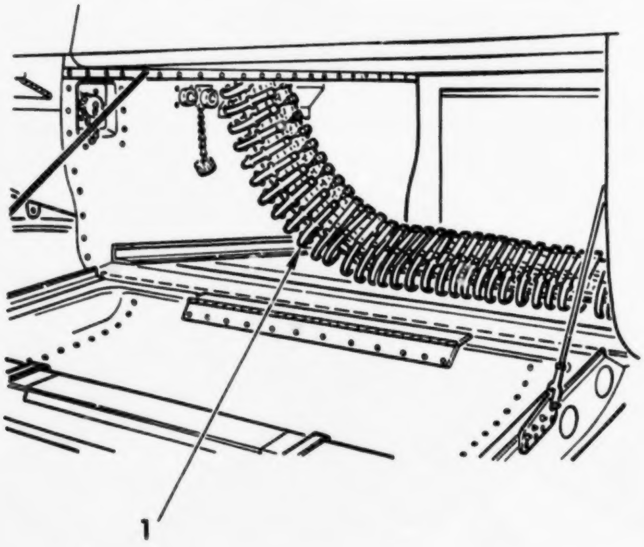
   Release two clips (3) and disconnect feed chute (1) from M89E1 feeder (2).



ARR82-27573

7. REMOVE FEED CHUTE (1).

   Pull feed chute (1) from turret and into ammunition bay.



ARR82-27574

3-59. REMOVAL/INSTALLATION OF AMMUNITION FEED SYSTEM (cont)

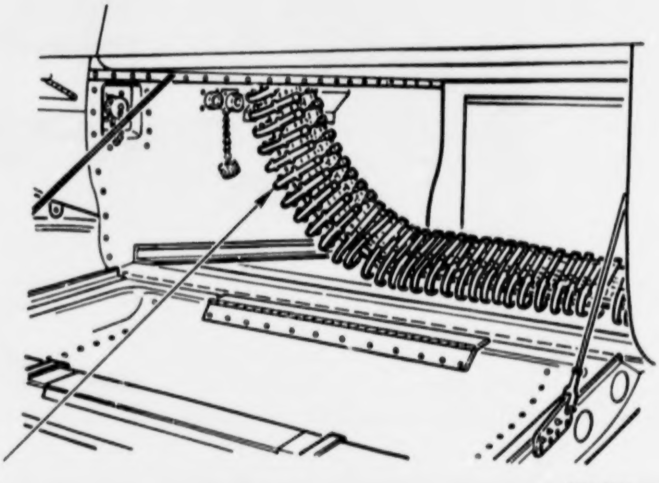
INSPECTION

8. INSPECT CABLE W1 IN ACCORDANCE WITH SECTION IV.

INSTALLATION

9. INSTALL FEED CHUTE (1).

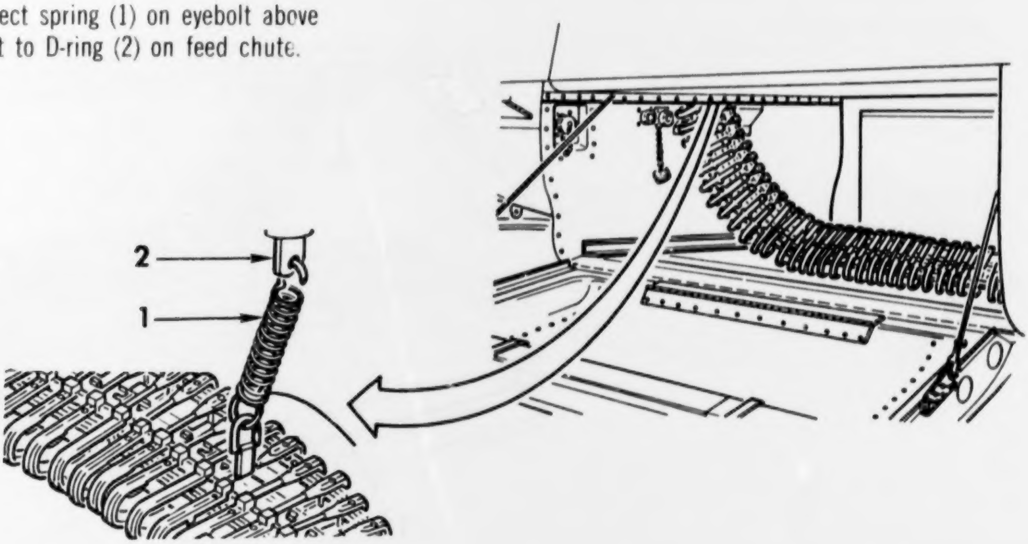
Place feed chute (1) in ammunition bay of helicopter bay. Insert chute, feeder end first and D-ring up, through opening in forward end of ammunition bay.



ARR82-27575

10. CONNECT SPRING (1).

Connect spring (1) on eyebolt above turret to D-ring (2) on feed chute.

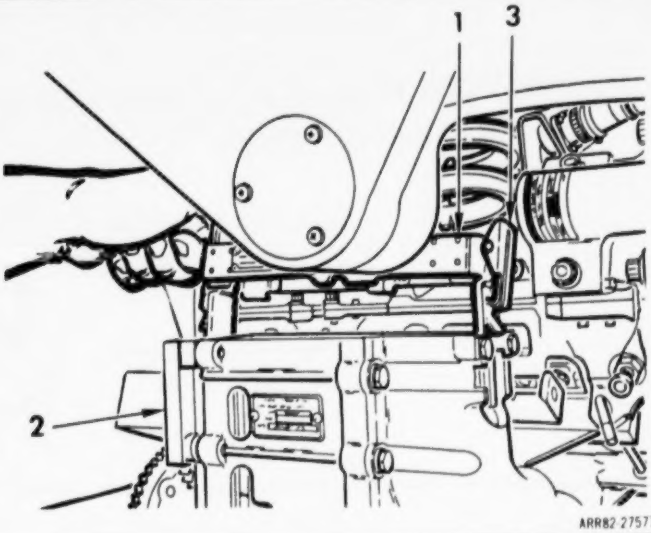


ARR82-27576

INSTALLATION (cont)

11. CONNECT FEED CHUTE (1) TO M89E1 FEEDER (2).

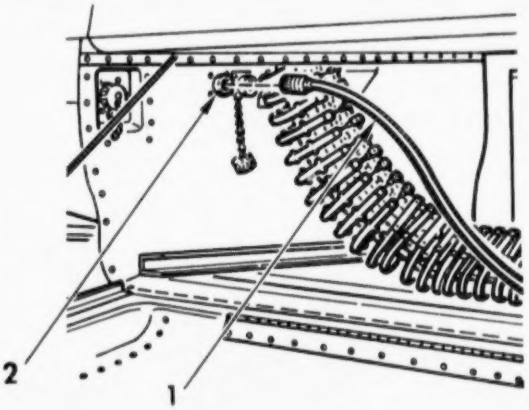
While pressing two clips (3), push end of feed chute (1) into M89E1 feeder (2).



ARR82-27577

2. CONNECT CABLE W1 (1).

Connect cable W1 (1) to connector 19B1J1 (2) on forward bulkhead of ammunition bay.

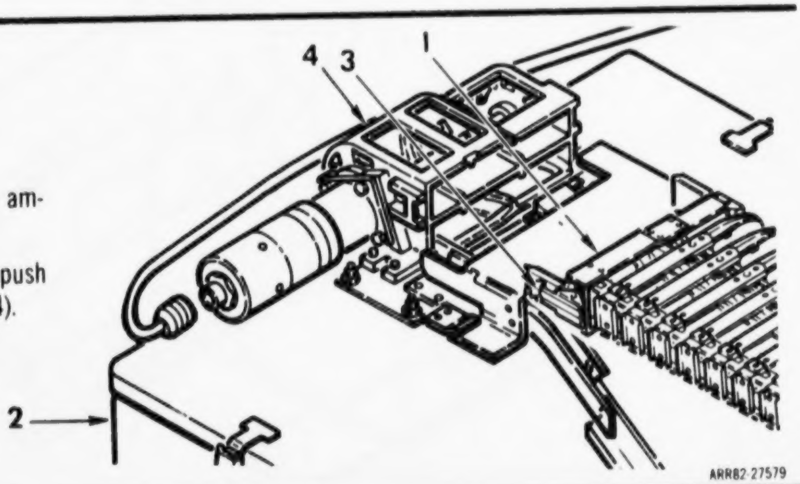


ARR82-27578

13. CONNECT FEED CHUTE (1) TO BOOSTER (4).

a. Place ammunition box (2) on ammunition bay access door.

b. While pressing two clips (3), push feed chute (1) into booster (4).

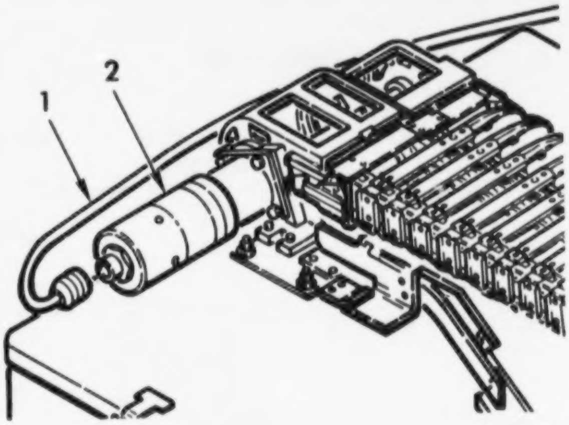


ARR82-27579

3-59. REMOVAL/INSTALLATION OF AMMUNITION FEED SYSTEM (cont)

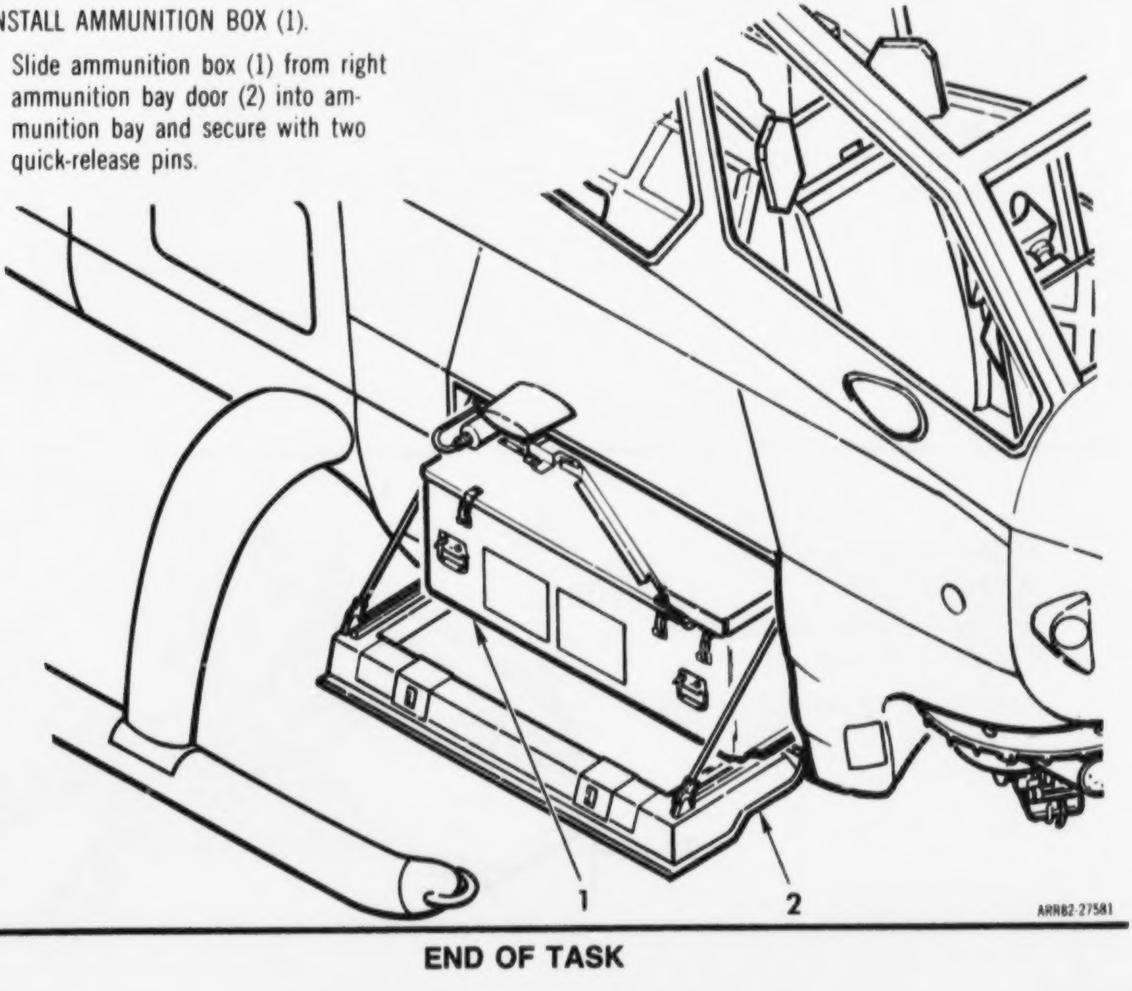
14. CONNECT CABLE W1 (1).

Connect cable W1 (1) to booster motor (2).



15. INSTALL AMMUNITION BOX (1).

Slide ammunition box (1) from right ammunition bay door (2) into ammunition bay and secure with two quick-release pins.



END OF TASK

3-60. REPAIR OF AMMUNITION BOX

DESCRIPTION

This task covers: Disassembly, cleaning, inspection, repair, and assembly.

INITIAL SETUP

Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental

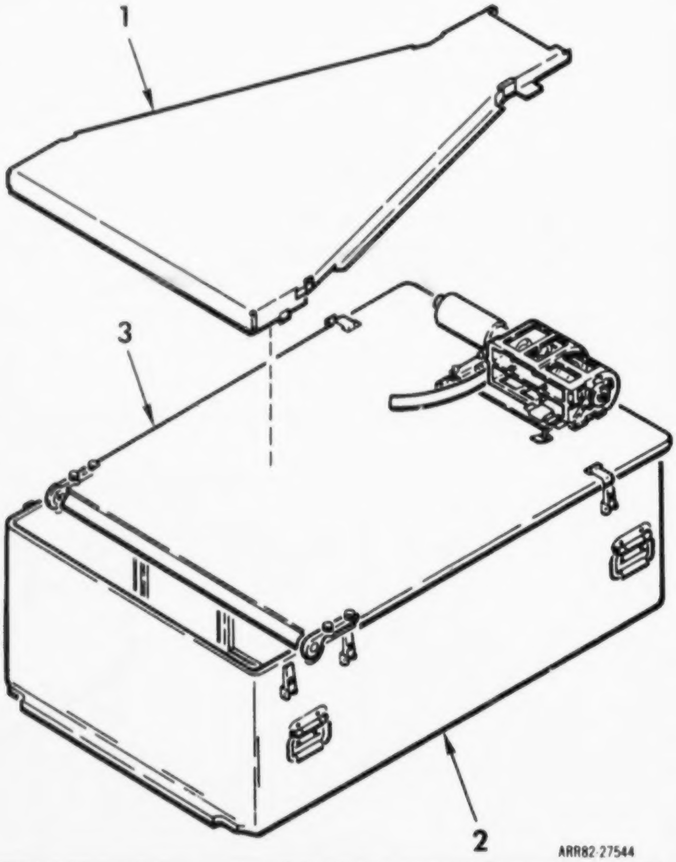
Materials:
  Adhesive (Item 1, Appx D)
  Solvent (Item 12, Appx D)

Personnel Required:
  68M Aircraft Weapon Systems
    Repairer

Equipment Conditions:
  In shop, on bench.

DISASSEMBLY

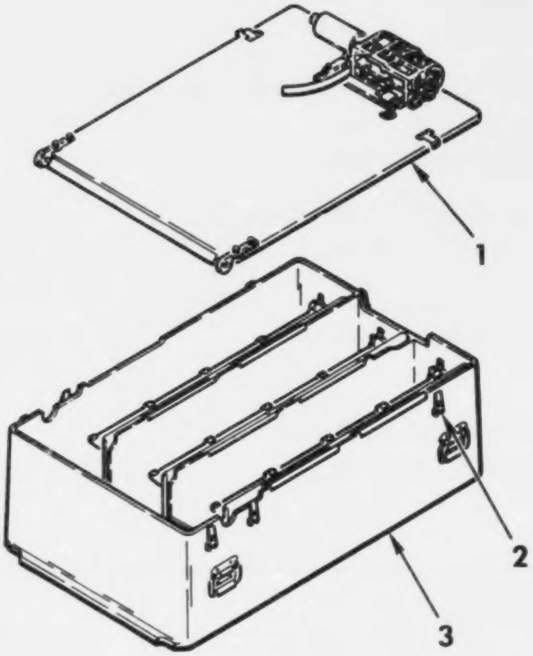
1. REMOVE BELLMOUTH GUIDE (1).
   a. Release two latches (2).
   b. Disengage and remove bellmouth guide (1) from cover (3).



3-60. REPAIR OF AMMUNITION BOX (cont)

2. REMOVE COVER (1).

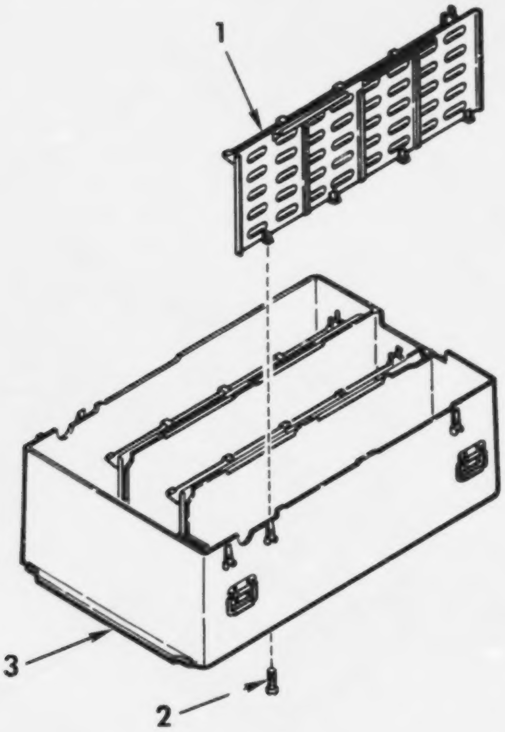
Release five latches (2) and remove cover (1) from box (3).



ARR82-27545

3. REMOVE SUPPORT PANELS (1).

Remove 12 screws (2) and 3 support panels (1) from box (3).

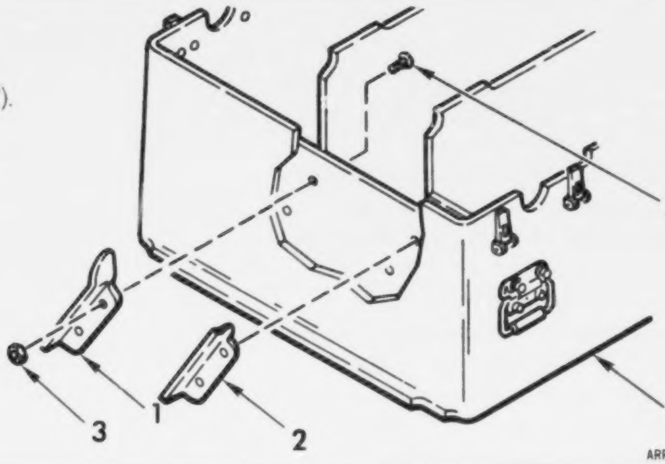


ARR82-27546

DISASSEMBLY (cont)

4. REMOVE BULKHEAD GUIDES (1 AND 2).

Remove four nuts (3), four screws (4), and bulkhead guides (1 and 2) from box (5).



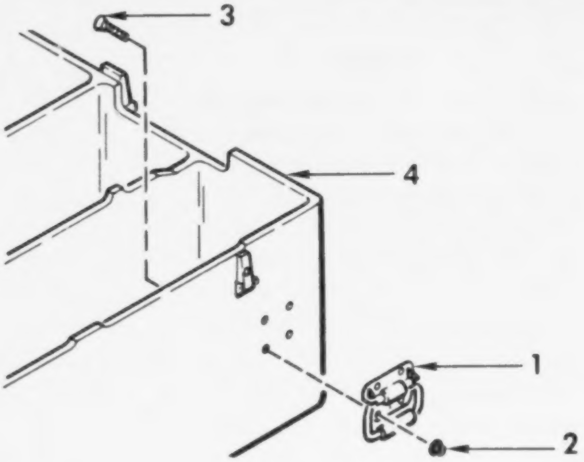
ARR82-27547

NOTE

Procedure is same for each of four handles.

5. REMOVE HANDLE (1).

Remove four nuts (2), four screws (3), and handle (1) from box (4).



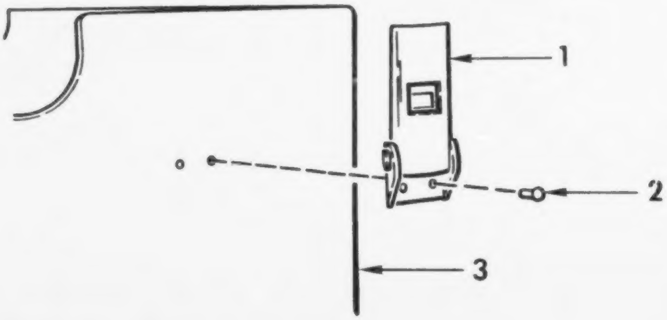
ARR82-27549

NOTE

Procedure is same for each of seven latches.

6. REMOVE LATCH (1).

Remove two rivets (2) and latch (1) from box (3).



ARR82-27548

3-60. REPAIR OF AMMUNITION BOX (cont)

CAUTION

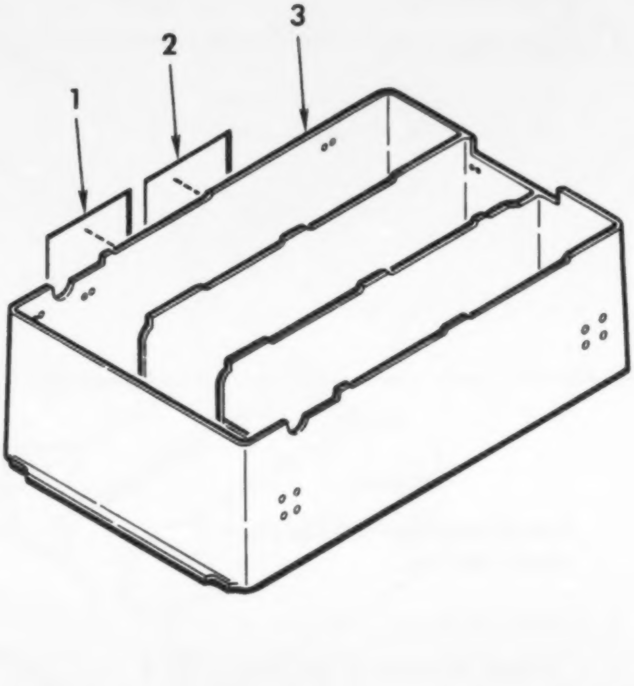
Removal of instruction plates may damage finish of box. Touchup of damaged finish is not authorized. Use of common finish materials will degrade functional integrity of box. Restoration of original finish by retouching or refinishing is specifically restricted to depot level maintenance.

NOTE

Instruction plates are located on left hand side of some boxes. If either instruction plate on these boxes is damaged, both instruction plates will be removed and new instruction plates will be applied on right hand side of box.

7. REMOVE INSTRUCTION PLATES (1 AND 2).

   Remove instruction plates (1 and 2) from box (3).



ARR82-27550

CLEANING

CAUTION

Solvents such as acetone, toluene, or trimethylene oxide will not be used to clean polycarbonate (Lexan) ammunition feed system components.

8. PERFORM GENERAL CLEANING PROCEDURES IN ACCORDANCE WITH SECTION IV.

INSPECTION

9. PERFORM GENERAL INSPECTION PROCEDURES IN ACCORDANCE WITH SECTION IV.

10. INSPECT FOR STRUCTURAL LEXAN SURFACE DEFECTS AS FOLLOWS:

Blisters.

Blisters that are larger than 0.030 inch in diameter or blisters that occur more than 10 times in a 1 square inch area are not permissible. A blister is defined as a rounded elevation of the surface with voids and boundaries that are more or less sharply defined.

Burned Areas.

Thermal decomposition and discoloration usually charred in appearance, on an area of the surface are not permissible.

Chips and Surface Voids.

Areas where a small portion of the resin is missing from corners or edges are not permissible.

Foreign Inclusions.

Particles in the lexan plastic which are foreign to the composition are not permissible on the surface of the lexan plastic.

Pits, Craters, Pinholes, and Porosity.

Small depressions, which include pits, craters, pinholes, and porosity, on the surface of the lexan plastic that are larger than 0.030 inch in diameter and depth or that occur more than 10 times in any 1 square inch area are not permissible.

3-60. REPAIR OF AMMUNITION BOX (cont)

Cracks.

Rupture of the lexan plastic surface is not permissible.

Spalls.

Breaks, chips, or scaled off areas on the surface of the lexan plastic are not permissible.

Other Surface Characteristics.

Surface characteristics other than those specified above such as surface roughness and marbling of surface color are permissible.

11. INSPECT PARTS IN ACCORDANCE WITH TABULATED DATA:

Component	Possible Defect	Remedy
Ammunition Box	Damaged or defective latches	Replace or straighten.
	Damaged or defective handles	Replace.
	Damaged or defective support panels	Straighten if possible; replace if defective.
	Cracked or distorted bulkhead guides	Straighten if possible; replace if defective.
	Stress cracks in polycarbonate (Lexan) material	Notify next higher maintenance level to repair defective part.
	Surface cracks caused by decomposition of polycarbonate (Lexan) material	If damaged area does not exceed 25 square inches, notify next higher maintenance level to repair defective part. If damaged area exceeds 25 square inches, replace defective part.
Bellmouth Guide	Damaged or defective hooks	Replace bellmouth guide.
	Cracked or broken stiffener	Replace bellmouth guide.
	Bent or dented	Straighten or replace.
	Loose or missing rivets	Tighten or replace.

REPAIR

12. POLYCARBONATE (LEXAN) REPAIR IS ACCOMPLISHED AT NEXT HIGHER MAINTENANCE LEVEL.

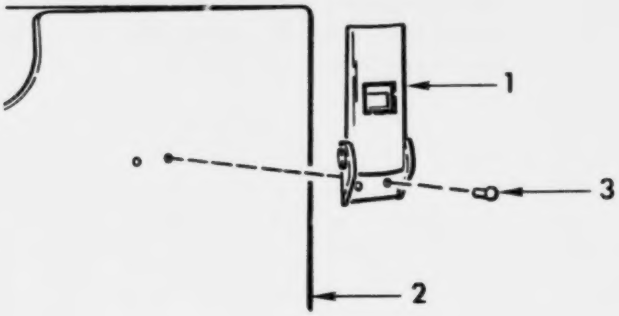
ASSEMBLY

NOTE

Procedure is same for each of seven latches.

13. INSTALL LATCH (1).

Position latch (1) on box (2) and secure with two blind rivets (3).



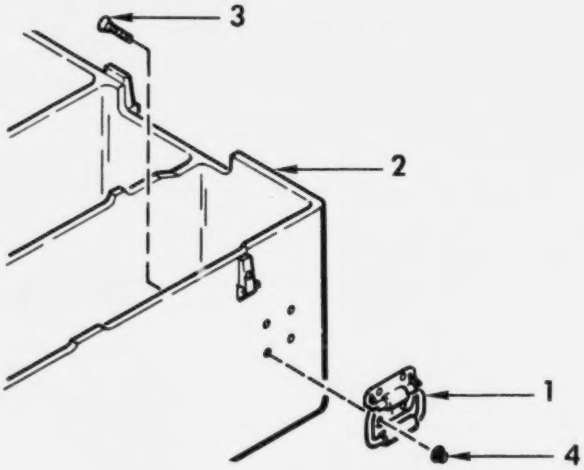
ARR82-27552

NOTE

Procedure is same for each of four handles.

14. INSTALL HANDLE (1).

Position handle (1) on box (2). Secure with four screws (3) and four nuts (4).

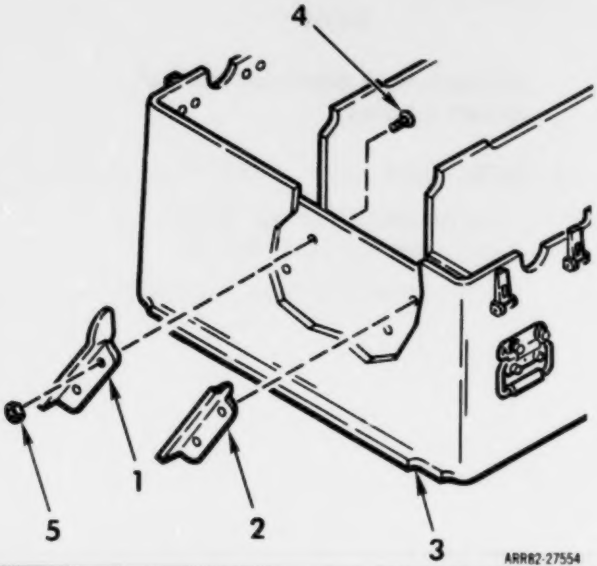


ARR82-27553

3-60. REPAIR OF AMMUNITION BOX (cont)

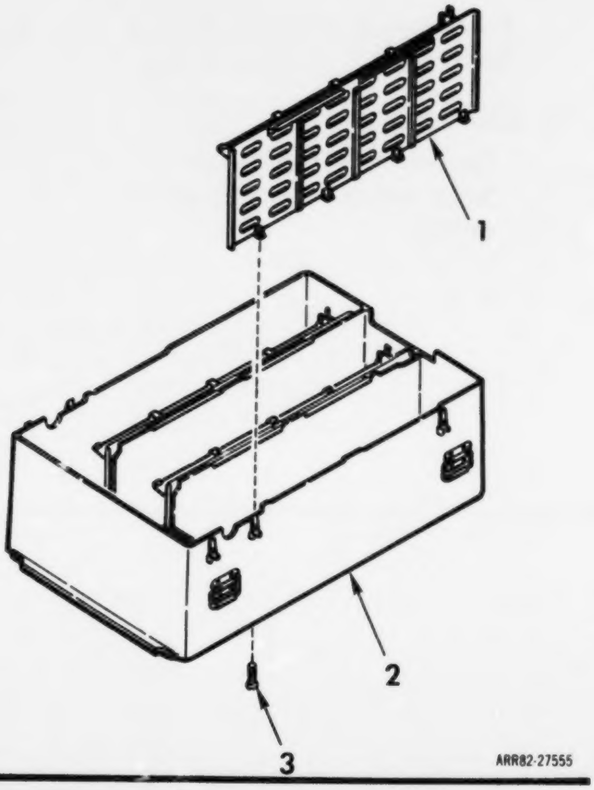
15. INSTALL BULKHEAD GUIDES (1 AND 2).

Position bulkhead guides (1 and 2) on bulkhead of box (3). Secure with four screws (4) and four nuts (5).


4
1
5
2
3
ARR82-27554

16. INSTALL SUPPORT PANELS (1).

Position 3 support panels (1) in box (2) and secure with 12 screws (3). Torque screws (3) to 15-20 lb-in. (1.7-2.3 N.m).

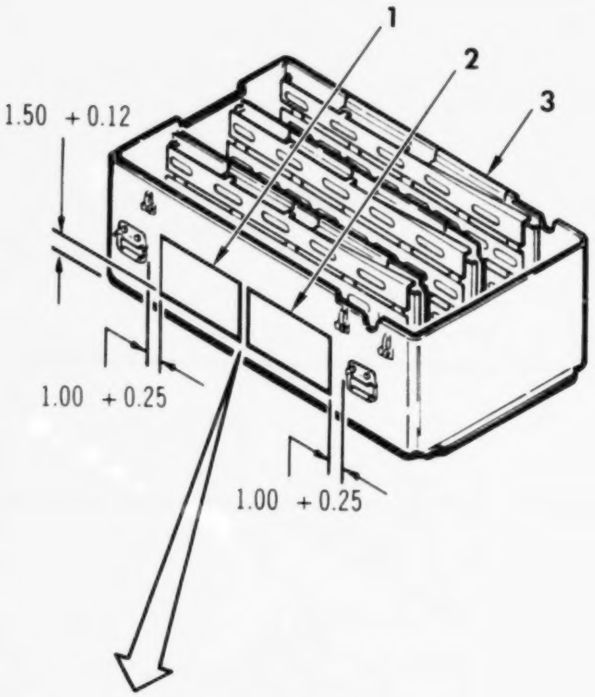

1
2
3
ARR82-27555

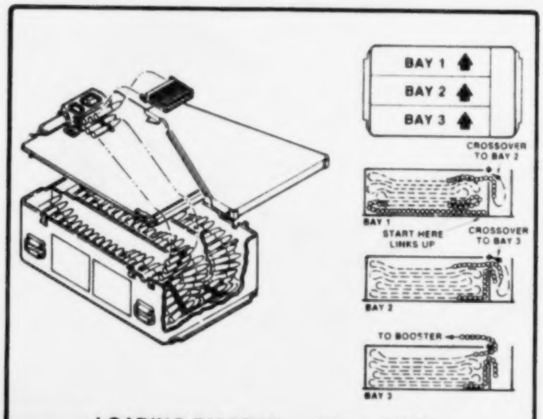
ASSEMBLY (cont)

WARNING

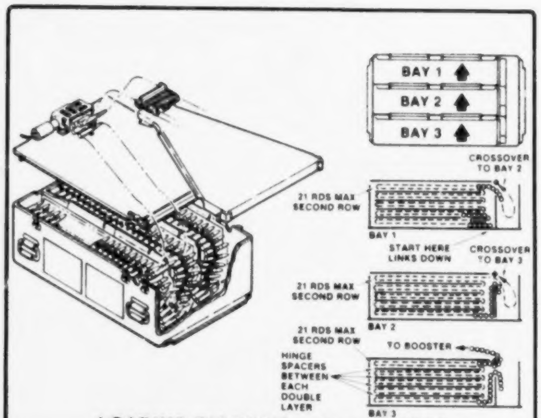
Do not use flammable materials near fire or an open flame. Most cleaning materials are harmful or fatal if swallowed. Use adequate ventilation. Avoid contact with skin and prolonged breathing of vapors.

17. INSTALL INSTRUCTION PLATES (1 AND 2).
    a. Clean instruction plate area (right hand side) of box (3) with solvent.
    b. Apply instruction plates (1 and 2) to box (3).


1
2
3
1.50 +0.12
1.00 +0.25
1.00 +0.25


BAY 1
BAY 2
BAY 3
CROSSOVER TO BAY 2
BAY 1
START HERE LINKS UP
CROSSOVER TO BAY 3
BAY 2
TO BOOSTER
BAY 3

LOADING DIAGRAM — 30mm AMMO


BAY 1
BAY 2
BAY 3
CROSSOVER TO BAY 2
21 RDS MAX SECOND ROW
BAY 1
START HERE LINKS DOWN
CROSSOVER TO BAY 3
21 RDS MAX SECOND ROW
BAY 2
21 RDS MAX SECOND ROW
TO BOOSTER
HINGE SPACERS BETWEEN EACH DOUBLE LAYER
BAY 3

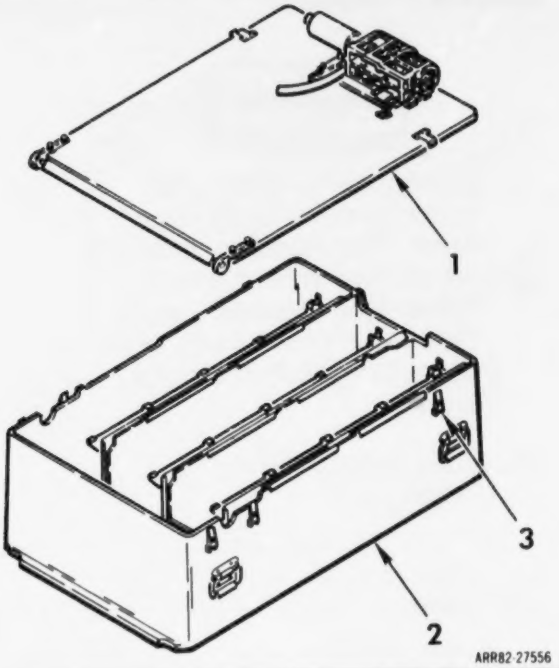
LOADING DIAGRAM — 20-mm AMMO

ARR82-27551

3-60. REPAIR OF AMMUNITION BOX (cont)

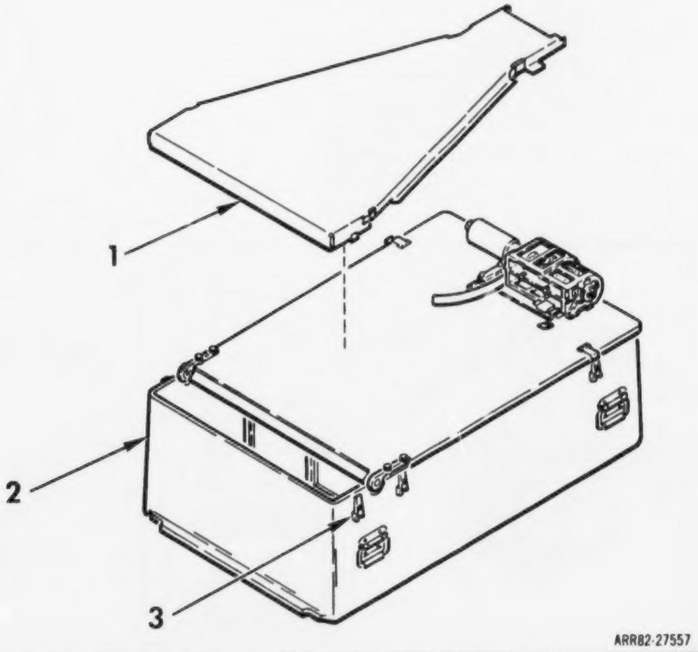
18. INSTALL COVER (1).

    Place cover (1) on box (2), and secure with five latches (3).


1
3
2
ARR82-27556

19. INSTALL BELLMOUTH GUIDE (1).

    Place bellmouth guide (1) on ammunition box (2) and slide into position. Secure with two latches (3).


1
2
3
ARR82-27557

END OF TASK

3-61. REPAIR OF COVER ASSEMBLY

DESCRIPTION

This task covers: Disassembly, cleaning, inspection, repair, and assembly.

INITIAL SETUP

Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental

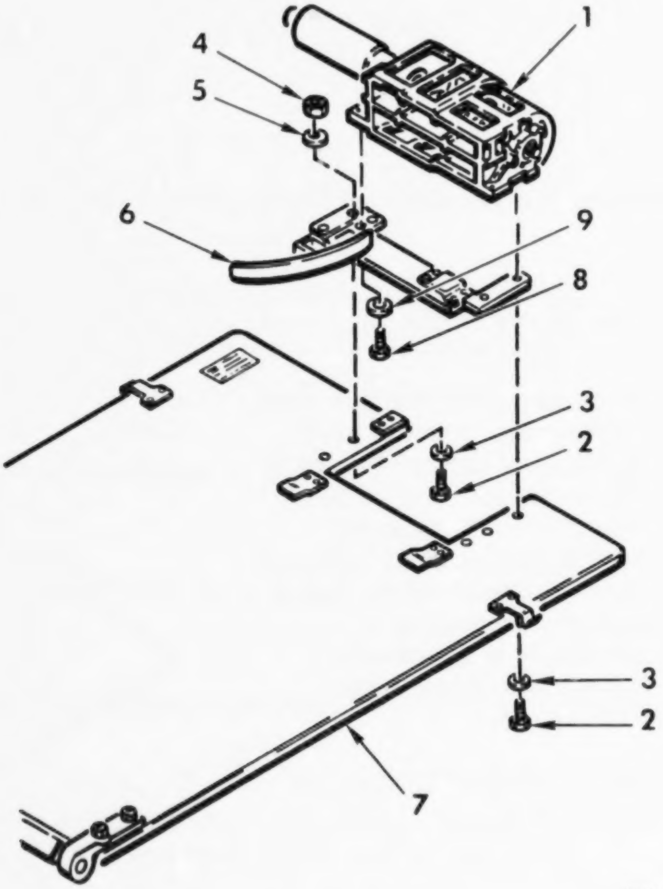
Materials:
  Adhesive (Item 1, Appx D)
  Solvent (Item 12, Appx D)

Personnel Required:
  68M Aircraft Weapon Systems
    Repairer

Equipment Conditions:
  In shop, on bench.

DISASSEMBLY

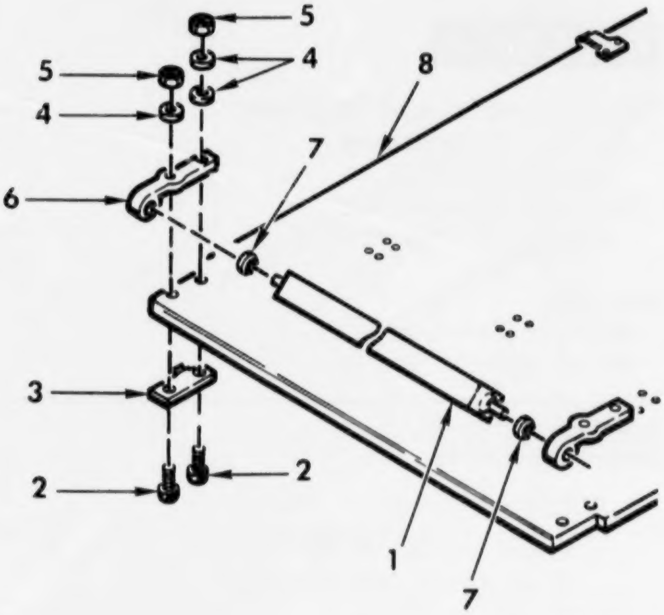
1. REMOVE BOOSTER (1).
   a. Remove four bolts (2), four washers (3), two nuts (4), and two washers (5).
   b. Remove adapter (6) and booster (1) from cover (7).
   c. Remove two bolts (8) and two washers (9) and separate adapter (6) from booster (1).



ARR82-27558

3-61. REPAIR OF COVER ASSEMBLY (cont)

2. REMOVE ROLLER (1).
   a. Remove four bolts (2), two catches (3), six washers (4), and four nuts (5).
   b. Remove two supports (6) two bearings (7), and roller (1) from cover (8).

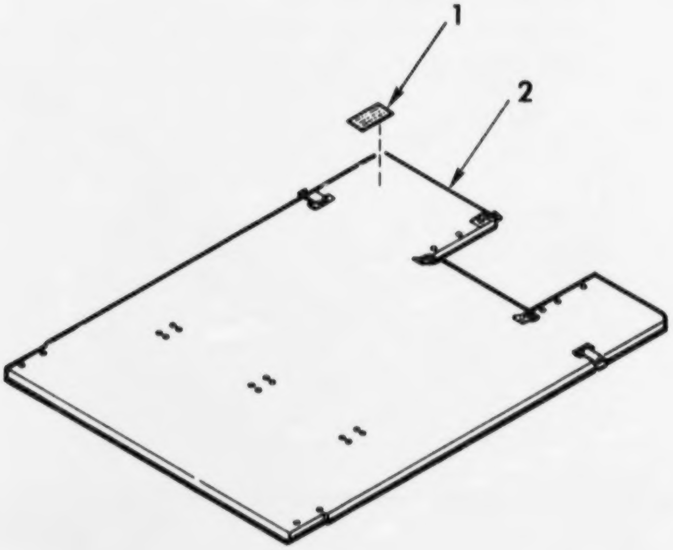


ARR82-27560

CAUTION

Removal of identification plate may damage finish of cover. Touchup of damaged finish is not authorized. Use of common finish materials will degrade functional integrity of cover. Restoration of original finish by retouching or refinishing is specifically restricted to depot level maintenance.

3. REMOVE IDENTIFICATION PLATE (1) FROM COVER (2).



ARR82-27559

CLEANING

CAUTION

Solvents such as acetone, toluene, or trimethylene oxide will not be used to clean polycarbonate (Lexan) ammunition feed system components.

4. PERFORM GENERAL CLEANING PROCEDURES IN ACCORDANCE WITH SECTION IV.

INSPECTION

5. PERFORM GENERAL INSPECTION PROCEDURES IN ACCORDANCE WITH SECTION IV.

6. INSPECT FOR STRUCTURAL LEXAN SURFACE DAMAGE.

Blisters.

Blisters that are larger than 0.030 inch in diameter or blisters that occur more than 10 times in a 1 square inch area are not permissible. A blister is defined as a rounded elevation of the surface with voids and boundaries that are more or less sharply defined.

Burned Areas.

Thermal decomposition and discoloration usually charred in appearance, on an area of the surface are not permissible.

Chips and Surface Voids.

Areas where a small portion of the resin is missing from corners or edges are not permissible.

Foreign Inclusions.

Particles in the lexan plastic which are foreign to the composition are not permissible on the surface of the lexan plastic.

Pits, Craters, Pinholes, and Porosity.

Small depressions, which include pits, craters, pinholes, and porosity, on the surface of the lexan plastic that are larger than 0.030 inch in diameter and depth or that occur more than 10 times in any 1 square inch area are not permissible.

3-61. REPAIR OF COVER ASSEMBLY (cont)

Cracks.

Rupture of the lexan plastic surface is not permissible.

Spalls.

Breaks, chips, or scaled off areas on the surface of the lexan plastic are not permissible.

Other Surface Characteristics.

Surface characteristics other than those specified above such as surface roughness and marbling of surface color are permissible.

7. INSPECT PARTS IN ACCORDANCE WITH TABULATED DATA:

Component	Possible Defect	Remedy
Box Cover	Damaged or defective hooks	Replace box cover or straighten.
	Damaged cover	Replace box cover.
	Stress cracks in polycarbonate (Lexan) material	Notify next higher maintenance level to repair defective part.
	Surface cracks caused by decomposition of polycarbonate (Lexan) material	If damaged area does not exceed 25 square inches, notify next higher maintenance level to repair defective part. If damaged area exceeds 25 square inches, replace defective part.
	Cracked or broken roller support	Replace.
	Cracked or binding bearings	Replace.
	Cracked or bent square roller	Replace.
	Bent brackets	Straighten or replace.
	Cracked or broken brackets	Replace.
Booster Adapter	Cracked or damaged guide	Replace.
	Cracked or damaged plate	Replace.
	Loose or missing rivets	Tighten or replace.

REPAIR

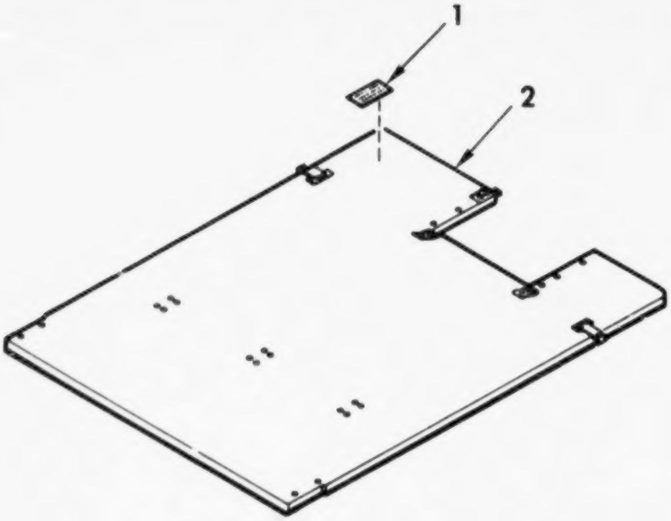
8. POLYCARBONATE (LEXAN) REPAIR IS ACCOMPLISHED AT NEXT HIGHER MAINTENANCE LEVEL.

ASSEMBLY

WARNING

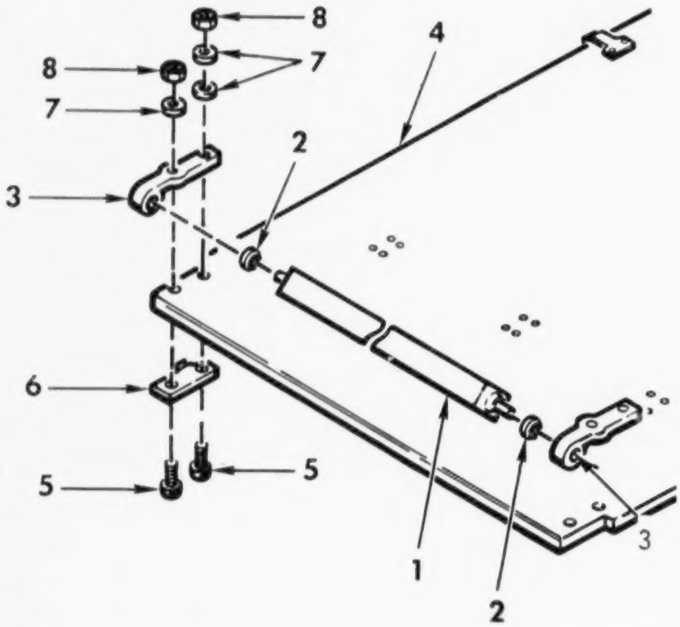
Do not use flammable materials near fire or an open flame. Most cleaning materials are harmful or fatal if swallowed. Use adequate ventilation. Avoid contact with skin and prolonged breathing of vapors.

9. INSTALL IDENTIFICATION PLATE (1).
   a. Clean identification plate area on cover (2) with solvent.
   b. Apply identification plate (1) to cover (2) using adhesive.



ARR82-27561

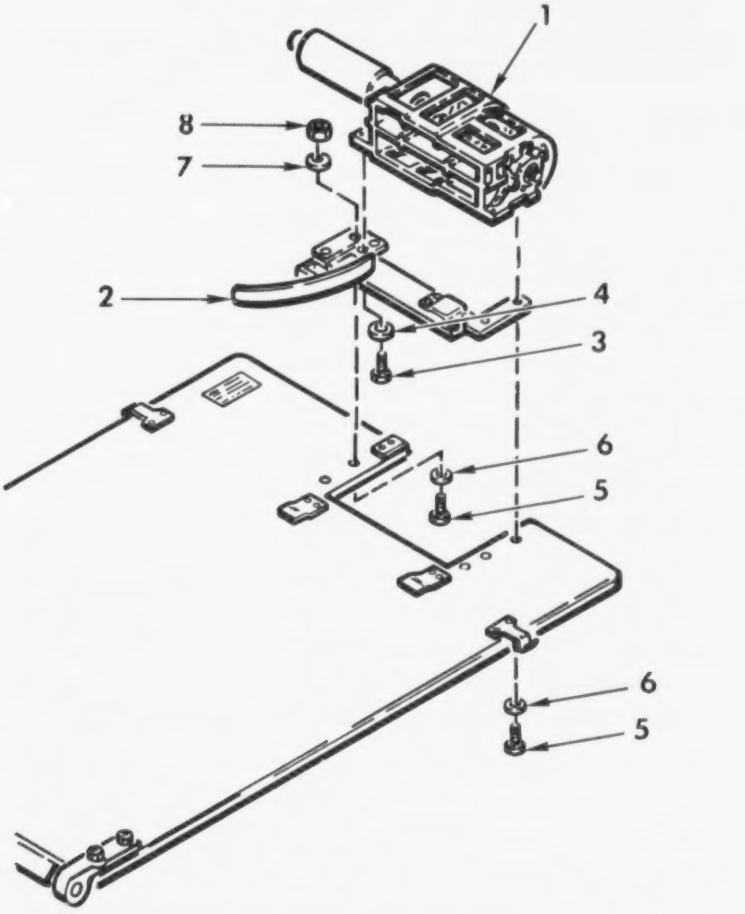
10. INSTALL ROLLER (1).
    a. Install two bearings (2), one on each end of the roller (1).
    b. Install two supports (3) on roller (1).
    c. Position supports (3) with bearings (2) and roller (1) on cover (4).
    d. Install four bolts (5), two catches (6), six washers (7), and four nuts (8) to secure roller assembly to cover (4).



ARR82-27562

3-61. REPAIR OF COVER ASSEMBLY (cont)

11. INSTALL BOOSTER (1).
    a. Install adapter (2) on booster (1) and secure using two bolts (3) and two washers (4).
    b. Install booster (1) with attached adapter (2) and secure using four bolts (5), four washers (6), two washers (7) and two nuts (8).



END OF TASK

3-62. REPAIR OF BOOSTER

DESCRIPTION

This task covers: Disassembly, cleaning, inspection, and assembly.

INITIAL SETUP

Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental

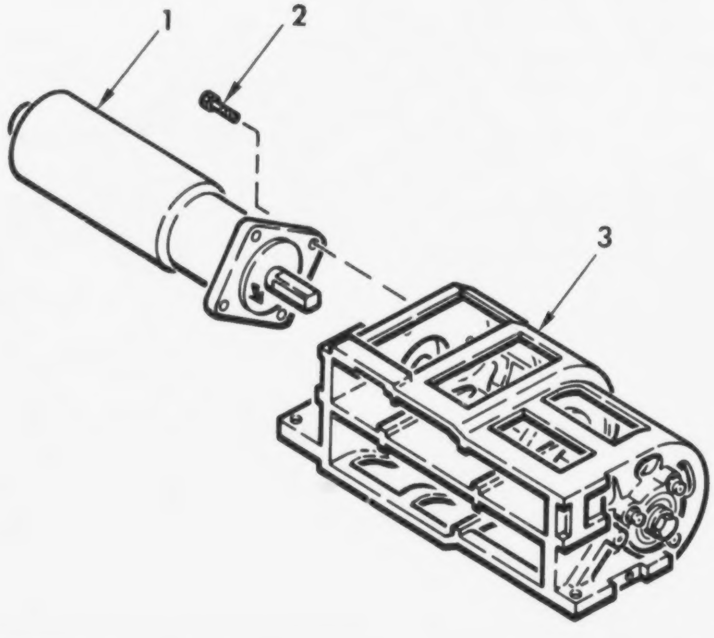
Personnel Required:
  68M Aircraft Weapon Systems
    Repairer

Equipment Conditions:
  In shop, on bench.

DISASSEMBLY

1. REMOVE MOTOR (1).

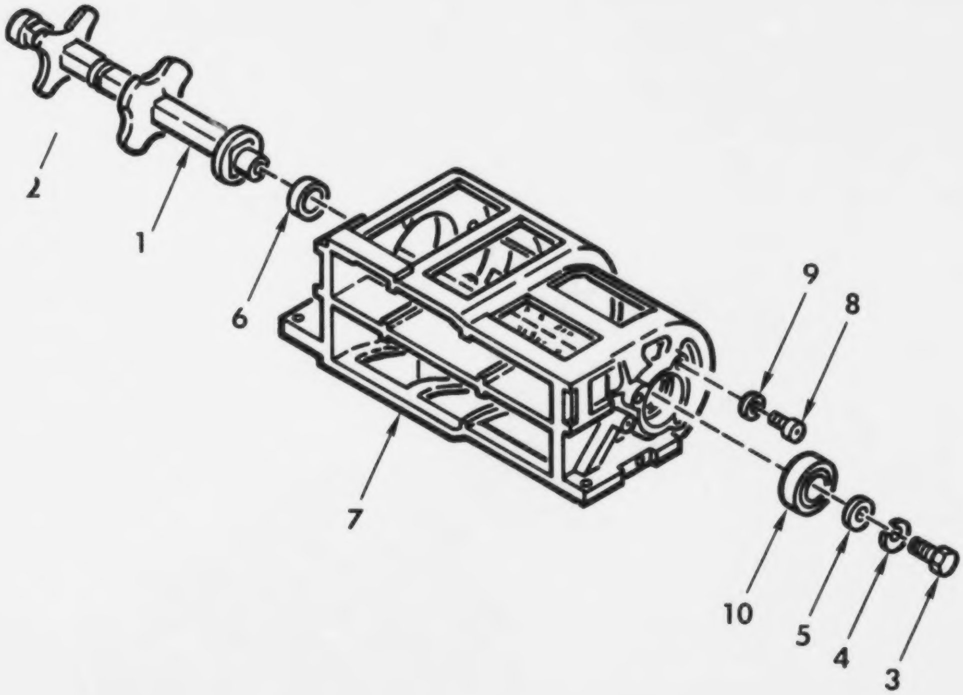
   Remove four bolts (2) and motor (1) from booster housing (3).



ARR82-27564

3-62. REPAIR OF BOOSTER (cont)

2. REMOVE SPROCKET SHAFT (1).
   a. While holding sprocket shaft (1) with a 5/8-inch wrench at location (2), remove bolt (3), lockwasher (4), and washer (5) from end of shaft.
   b. Remove sprocket shaft (1) and spacer (6) from booster housing (7).
   c. Remove three screws (8), three washers (9), and bearing (10) from booster housing (7).



ARR82-27565

CLEANING

3. PERFORM GENERAL CLEANING PROCEDURES IN ACCORDANCE WITH SECTION IV.

INSPECTION

4. PERFORM GENERAL INSPECTION PROCEDURES IN ACCORDANCE WITH SECTION IV.

5. INSPECT PARTS IN ACCORDANCE WITH TABULATED DATA.

NOTE

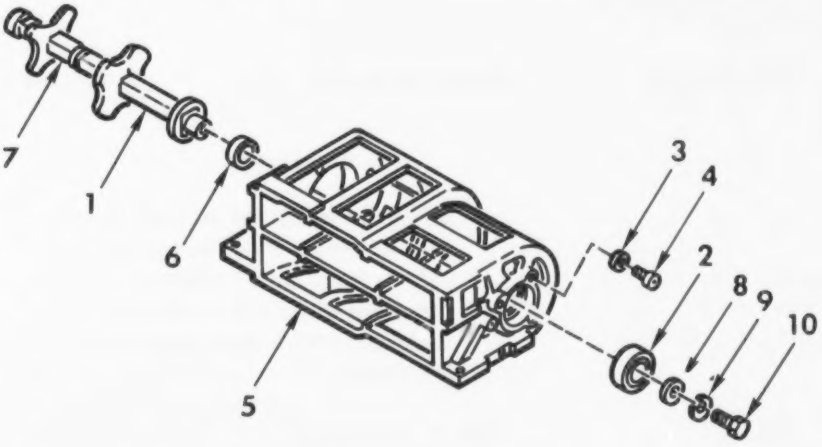
Motor is designed so that shaft rotates freely in direction of arrow. Rotation of shaft in opposite direction is difficult because entire gear train must be driven.

Component	Possible Defect	Remedy
Motor	Open or short circuit	Replace motor.
	Defective connector	Replace motor.
	Bent connector pins	Straighten.
Sprocket Shaft	Deformed motor drive sprocket	Replace sprocket shaft.
	Deformed or cracked sprocket	Replace sprocket shaft.
Spacer	Cracked	Replace.
Bearing	Corroded, rusty, noisy or rough	Replace.
Booster housing	Scored or galled guide surfaces	Smooth or replace booster housing.
	Cracked or warped	Replace.
	Deformed bearing bore	Replace.

3-62. REPAIR OF BOOSTER (cont)

ASSEMBLY

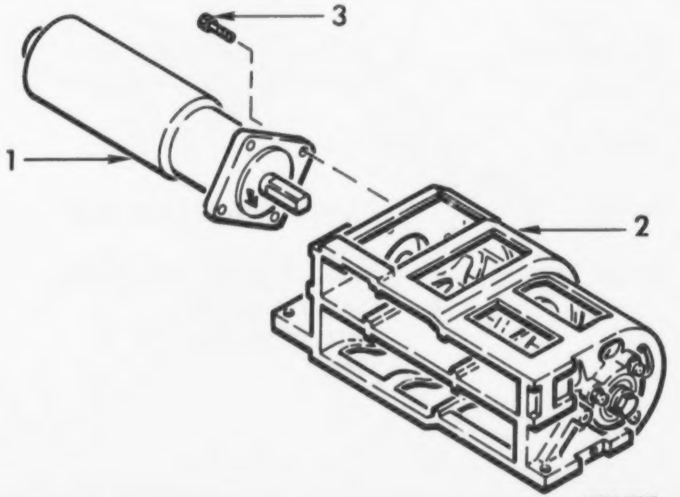
6. INSTALL SPROCKET SHAFT (1).
   a. Install bearing (2), three washers (3), and three screws (4) in booster housing (5).
   b. Install spacer (6) and sprocket shaft (1) in booster housing (5).
   c. While holding sprocket shaft (1) with a 5/8-inch wrench at location (7), install washer (8), lockwasher (9), and bolt (10) in end of sprocket shaft.



ARR82-27566

7. INSTALL MOTOR (1).

   Position motor (1) on booster housing (2) and secure with four bolts (3).



ARR82-27567

END OF TASK

3-63. REPAIR OF FEED CHUTE

DESCRIPTION

This task covers: Disassembly, cleaning, inspection, and assembly.

INITIAL SETUP

Tools/Test and Support Equipment:
Tool Set, A/C Armament
Repairman: Basic

Personnel Required:
68M Aircraft Weapon Systems
Repairer

Equipment Conditions:
In shop, on bench.

DISASSEMBLY

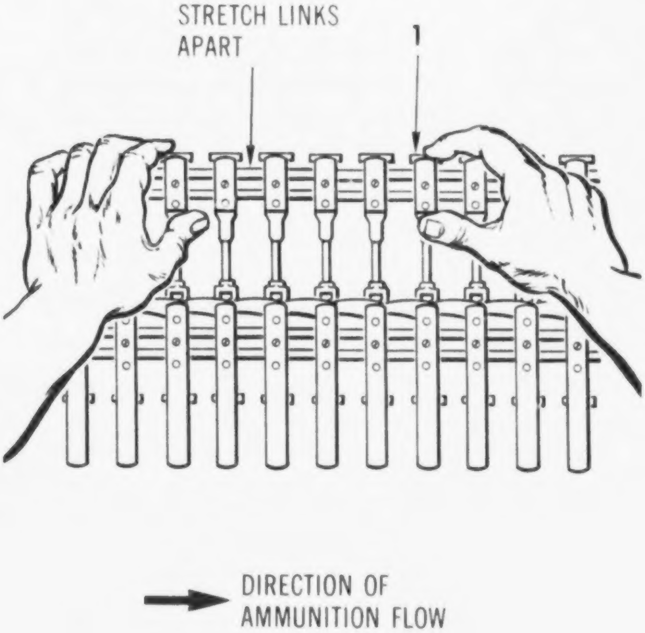
WARNING

Exercise care when working on feed chute. Sharp edges may cause injury.

NOTE

The following procedure is typical for any of the sections of the feed chute.

1. EXTEND CHUTING SECTIONS (1).
   Extend chuting sections (1), on each side of section (or sections) to be removed, to full length.



ARR82-27582

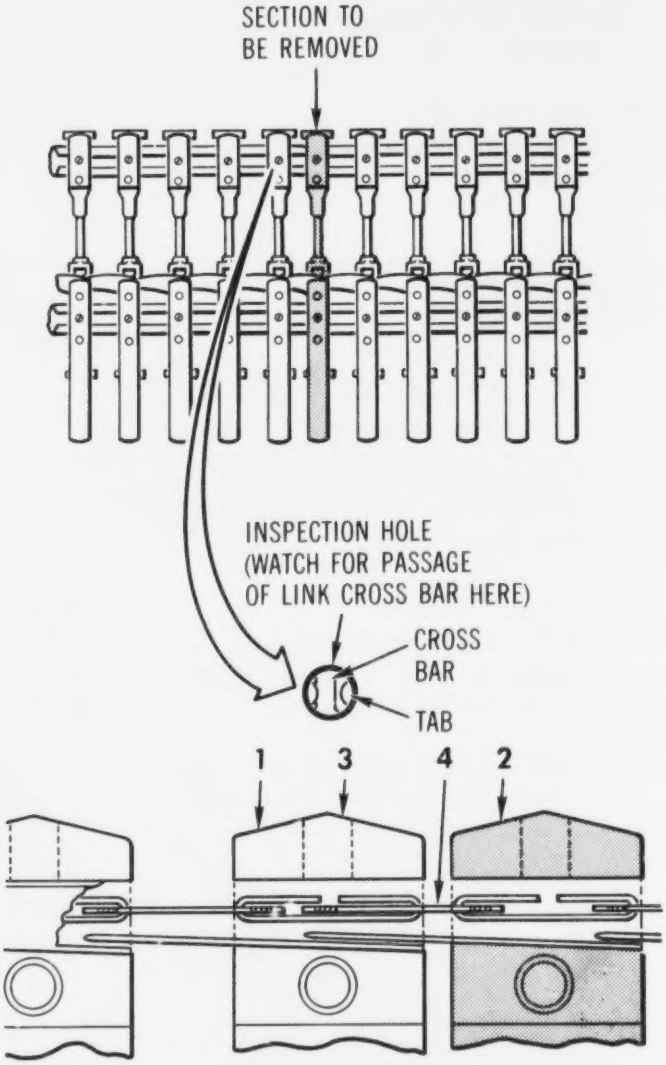
3-63. REPAIR OF FEED CHUTE (cont)

NOTE

When removing a box end section, connecting link of box end must be removed from the first chuting section. In some instances, the first chuting section and the box end will come off together and must then be separated.

2. COMPRESS SECTIONS (1 AND 2).

   While looking into inspection hole (3) of section to be removed, compress sections (1 and 2) until crossbar of link (4) which connects these sections can be seen passing across center of inspection hole.

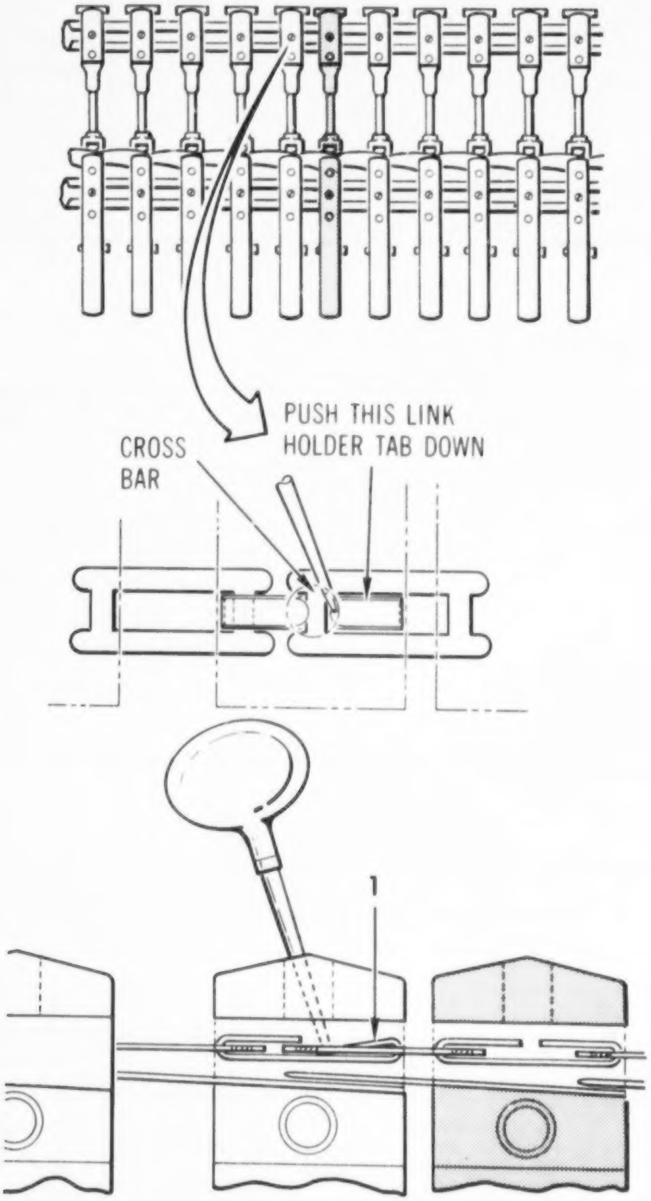

SECTION TO
BE REMOVED
INSPECTION HOLE
(WATCH FOR PASSAGE
OF LINK CROSS BAR HERE)
CROSS
BAR
TAB
1
3
4
2

ARR82-27583

DISASSEMBLY (cont)

3. DEPRESS LINK HOLDER TAB (1).

   Press down firmly on link holder tab (1) with an awl or other pointed tool.


PUSH THIS LINK HOLDER TAB DOWN
CROSS BAR
1

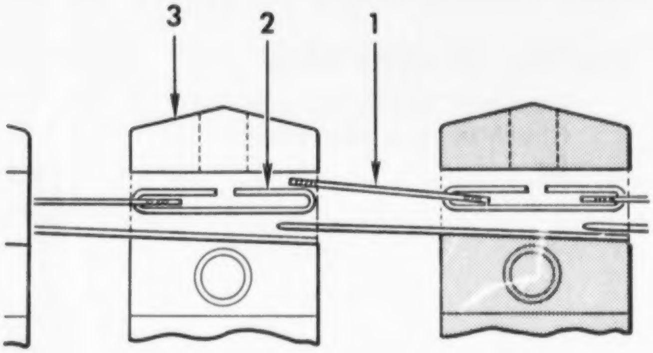
ARR82-27584

3-63. REPAIR OF FEED CHUTE (cont)

DISASSEMBLY (cont)

4. SEPARATE LINK (1).

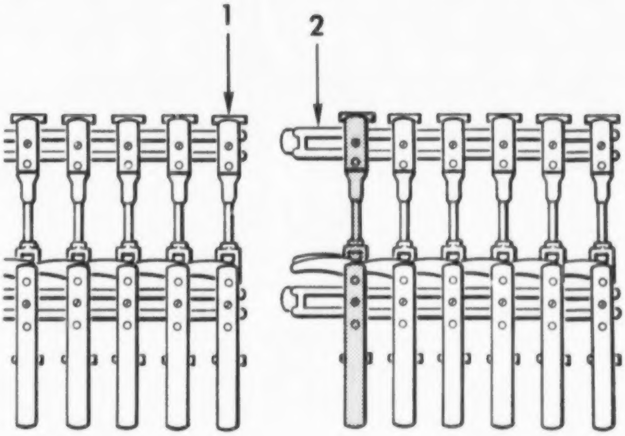
Pull link (1) free from link holder (2) of section to be removed (3).



ARR82-27585

5. SEPARATE SECTION (1).

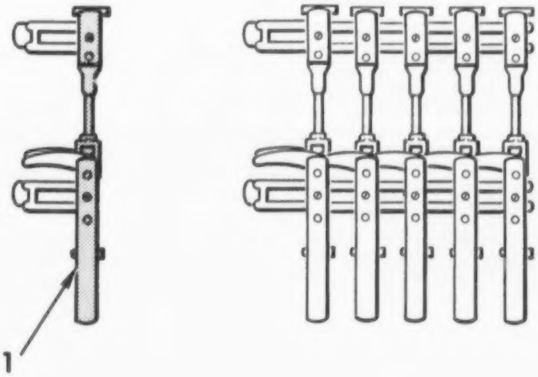
Perform steps 2 through 4 for each of remaining three links connecting section (1) to section (2), then separate section (1) from section (2).



ARR82-27586

6. REMOVE SECTION (1).

Perform steps 2 through 5 on adjacent section.



ARR82-27587

CLEANING

7. PERFORM GENERAL CLEANING PROCEDURES IN ACCORDANCE WITH SECTION IV.

INSPECTION

8. PERFORM GENERAL INSPECTION PROCEDURES IN ACCORDANCE WITH SECTION IV.

ASSEMBLY

WARNING

Exercise care when working on feed chute. Sharp edges may cause injury.

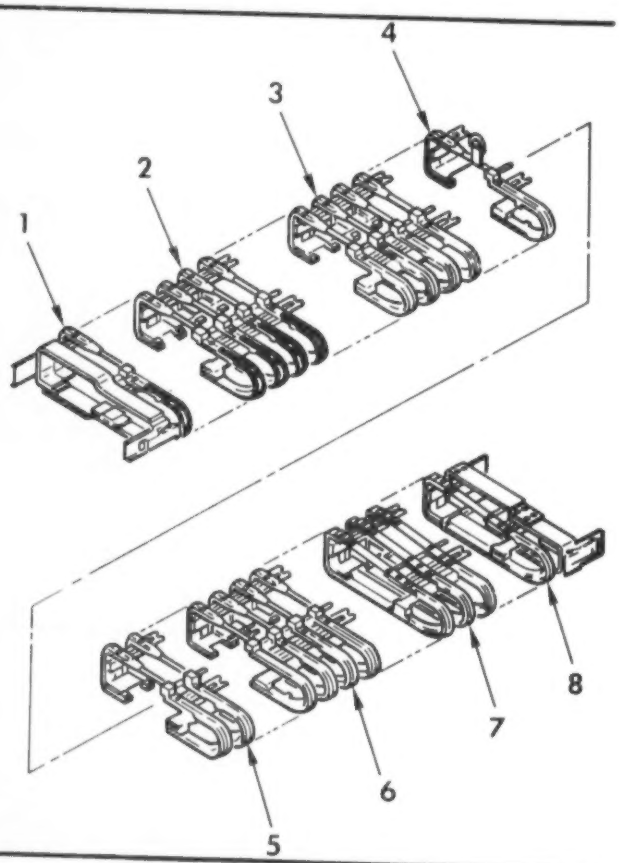
NOTE

The following procedure is typical for any of the sections of the feed chute.

9. ASSEMBLE CHUTING SECTIONS.

Assemble chuting sections in order and number as follows:

Beginning with feeder end assembly (1), place in line 8 plated center sections (2), 7 center sections (3), a ring section (4), 2 center sections (5), 9 tapered center sections (6), 37 solid sections (7), and a booster end assembly (8).



ITEM NUMBER	ITEM NAME	PART NUMBER	QUANTITY REQUIRED
1	Feeder End Assembly	11830873-100	1
2	Plated Center Sections	11830873-106	8
3	Center Sections	11830873-101	7
4	Ring Section	11830873-103	1
5	Center Sections	11830873-101	2
6	Tapered Center Sections	11830873-102	9
7	Solid Sections	11830873-104	37
8	Booster End Assembly	11830873-105	1

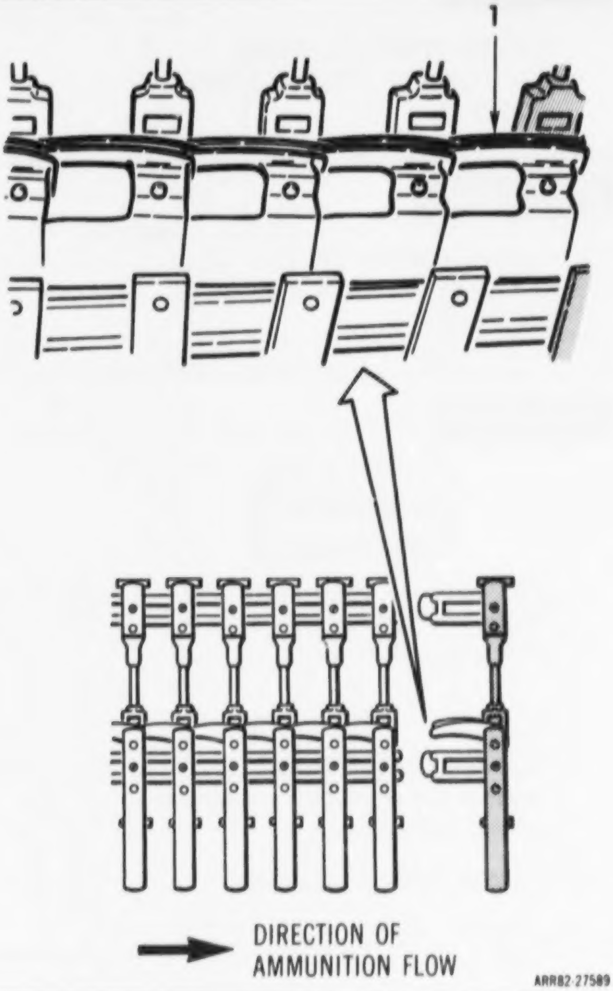
ARR82-27588

3-63. REPAIR OF FEED CHUTE (cont)

ASSEMBLY (cont)

10. ALINE TRACK GUIDES (1).

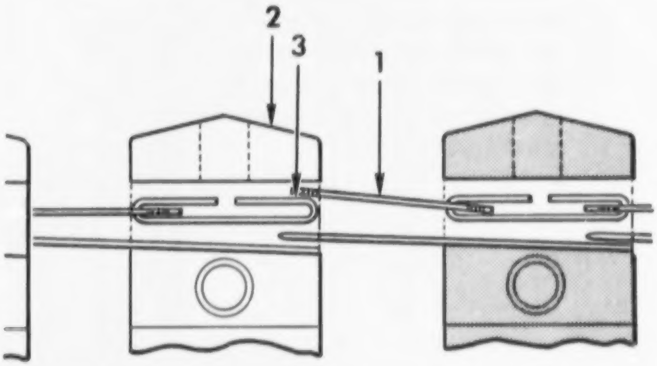
Place end of each track guide (1) protruding from section on right under end of corresponding track guide on section at left so that guides overlap each other.



ARR82-27589

11. ALINE LINKS (1).

Place end of each link (1) protruding from section on right into position under frame of section on left so that crossbar of each link is inserted between section frame (2) and tab of link holder (3).

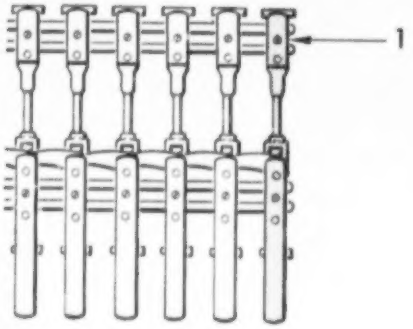


ARR82-27590

ASSEMBLY (cont)

12. INSTALL SECTION (1).

Install section (1) by pressing two sections together.



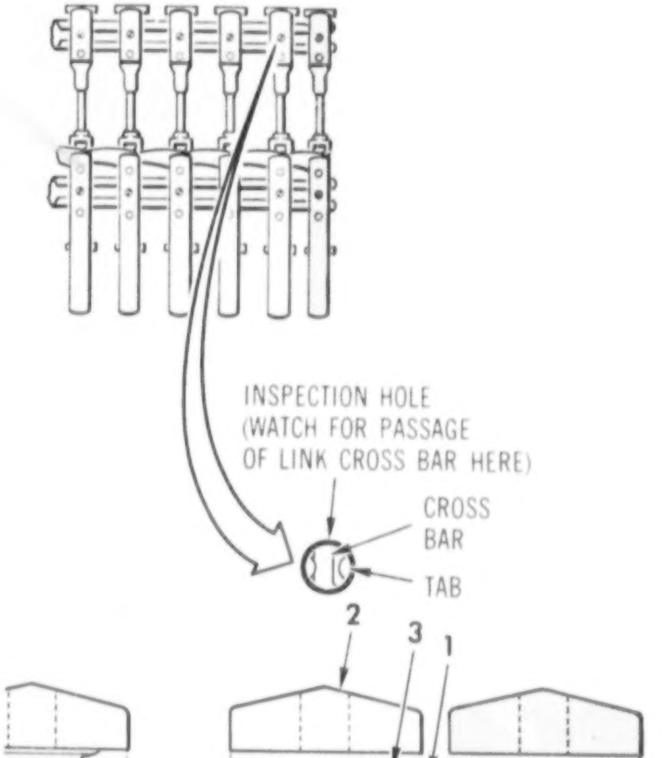
ARR82 27591

13. CHECK ENGAGEMENT OF LINKS (1).

a. While holding two sections together, look into each of four inspection holes (2) and check that crossbar of each link (1) has passed completely over right hand tab of link holder (3) and is snapped into position.

b. If any of four links (1) has not snapped into position, move it into place with an awl or other pointed tool.

c. Pull the two sections in opposite directions and check engagement of links (1) in link holders (3). Re-insert any link that pulls free.


INSPECTION HOLE
(WATCH FOR PASSAGE
OF LINK CROSS BAR HERE)
CROSS
BAR
TAB
2
3
1

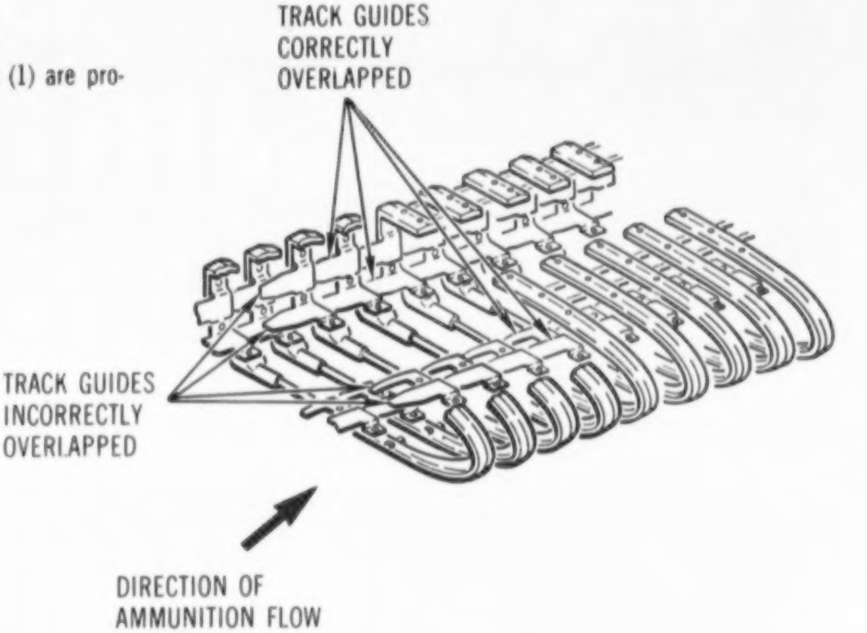
ARR82 27592

3-63. REPAIR OF FEED CHUTE

ASSEMBLY (cont)

14. CHECK TRACK GUIDES (1).

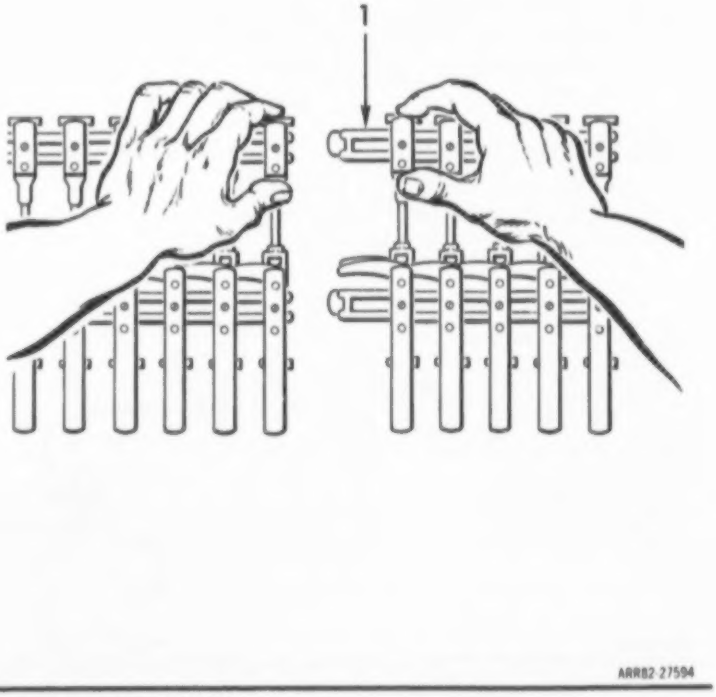
    Check that track guides (1) are properly overlapped.


TRACK GUIDES
CORRECTLY
OVERLAPPED
TRACK GUIDES
INCORRECTLY
OVERLAPPED
DIRECTION OF
AMMUNITION FLOW

ARR82-27593

15. INSTALL REMAINING SECTIONS (1).

    Repeat steps 9 through 14 above to install remaining sections (1).



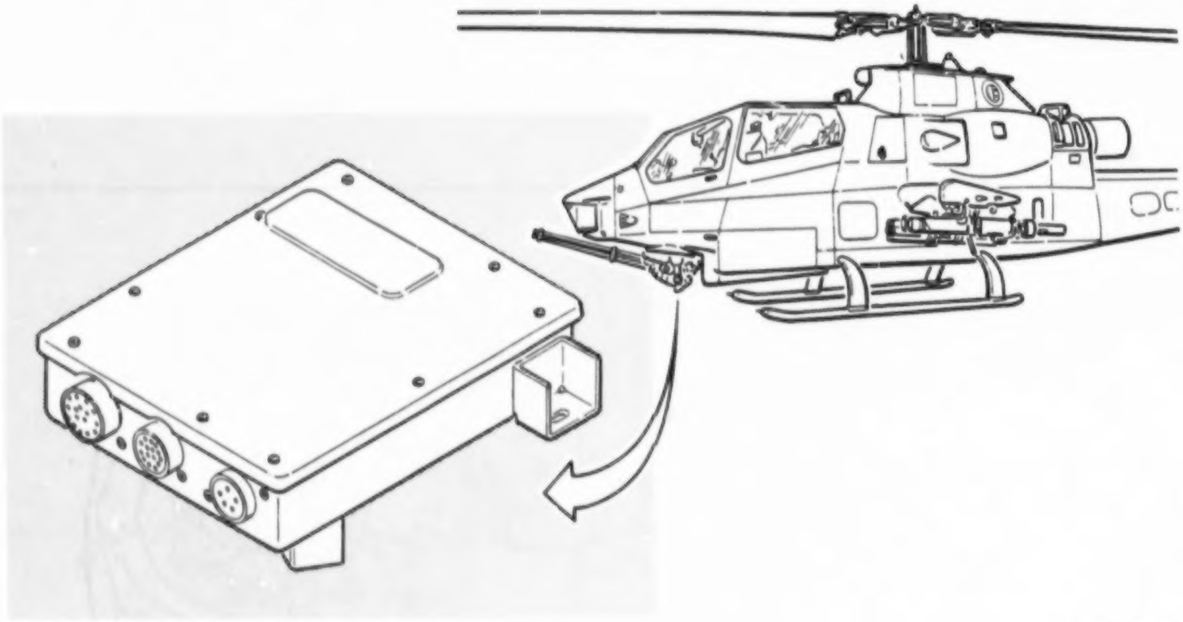
ARR82-27594

END OF TASK

Section XIII. MAINTENANCE OF EMERGENCY STOW CONTROL UNIT

Section Contents — Para

Removal/Installation of Emergency Stow Control Unit 3-64



3-64. REMOVAL/INSTALLATION OF EMERGENCY STOW CONTROL UNIT

DESCRIPTION

This task covers: Removal and installation.

INITIAL SETUP

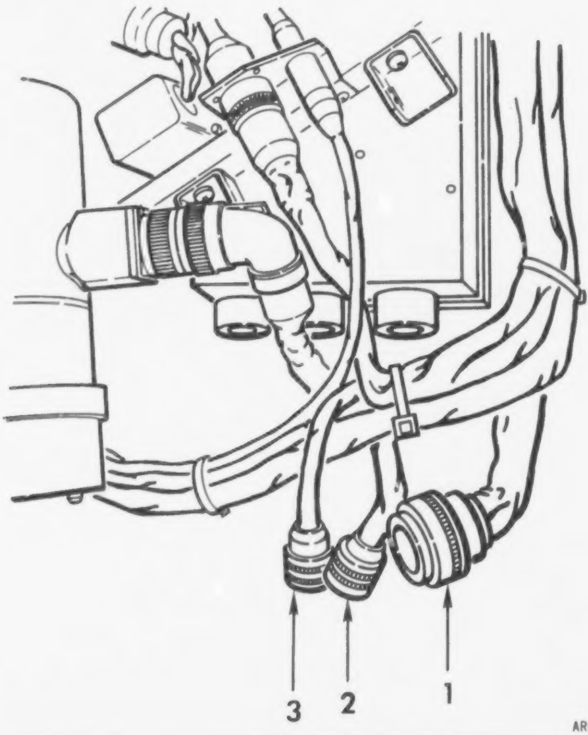
Tools/Test and Support Equipment:
Tool Set, A/C Armament
Repairman: Basic
Tool Set, A/C Armament
Repairman: Supplemental

Personnel Required:
68J Aircraft Fire Control
Repairer

Equipment Conditions:
REMOVAL OF M197 GUN
performed, para 3-45.

REMOVAL

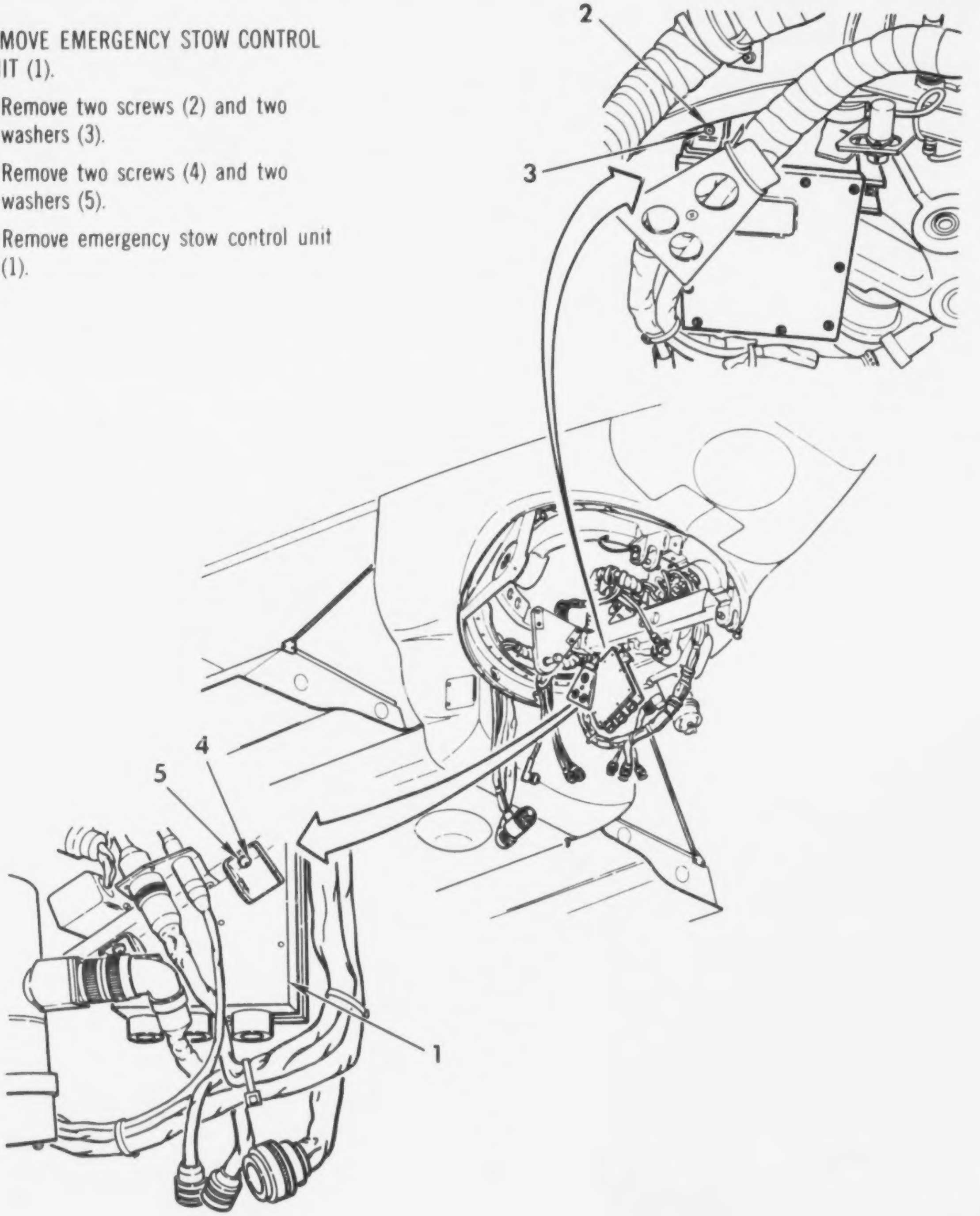
1. DISCONNECT THREE CONNECTORS W4P20 (1), W1P21 (2), AND W3P19 (3).



ARR82-27959

REMOVAL (cont)

2. REMOVE EMERGENCY STOW CONTROL UNIT (1).
   a. Remove two screws (2) and two washers (3).
   b. Remove two screws (4) and two washers (5).
   c. Remove emergency stow control unit (1).



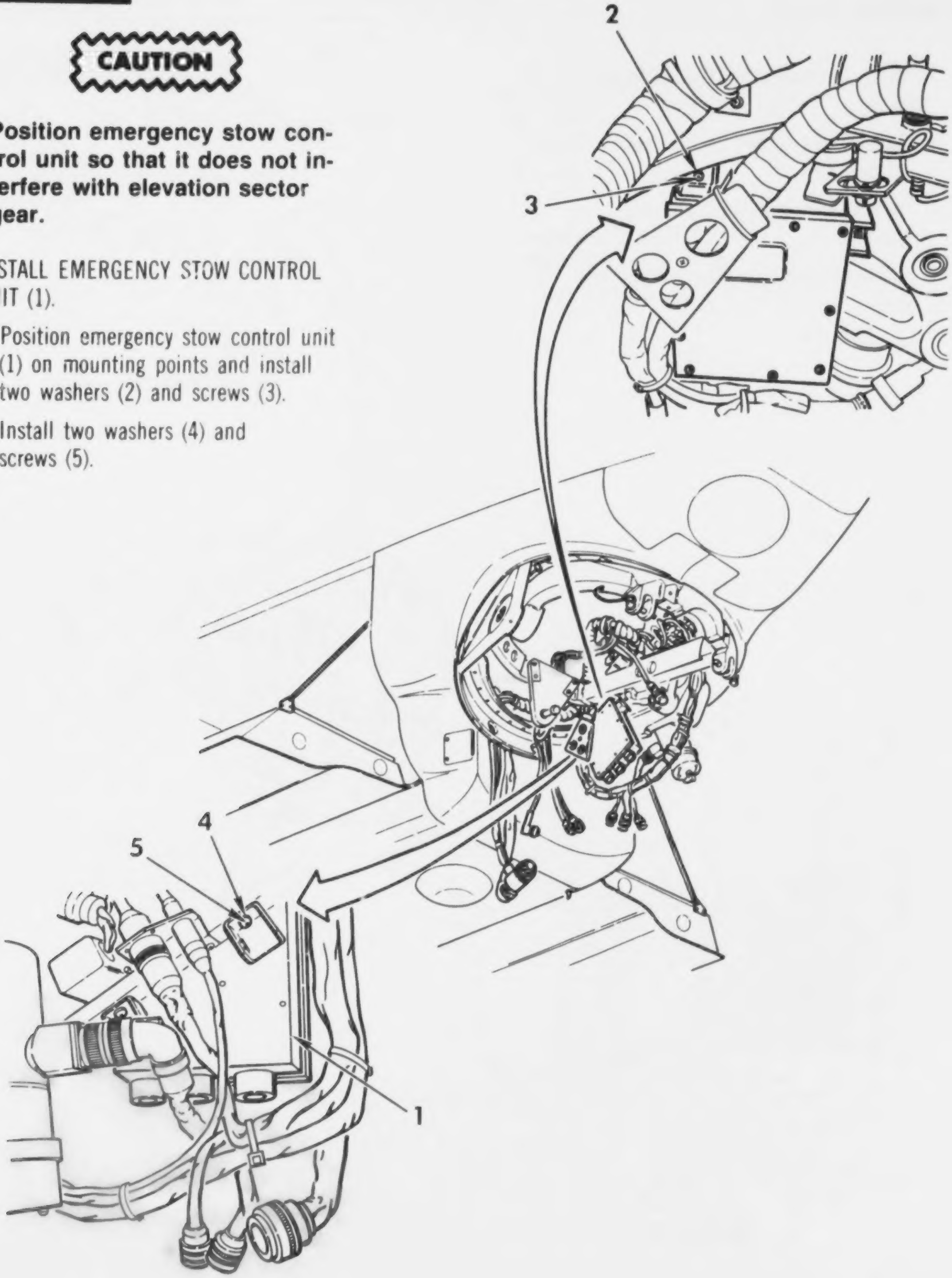
3-64. REMOVAL/INSTALLATION OF EMERGENCY STOW CONTROL UNIT (cont)

INSTALLATION

CAUTION

Position emergency stow control unit so that it does not interfere with elevation sector gear.

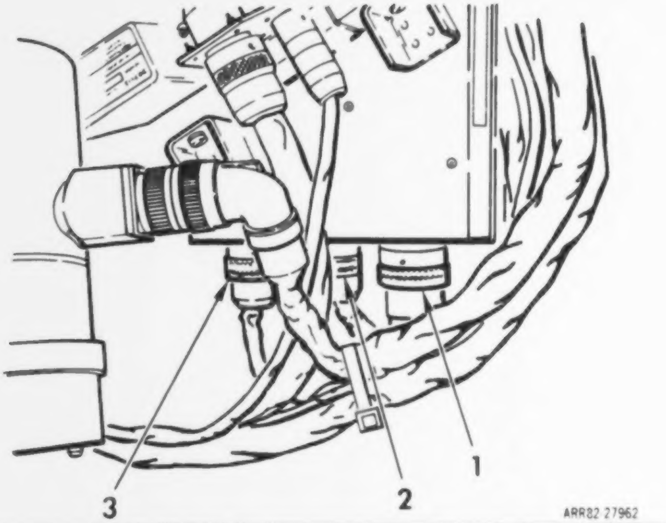
3. INSTALL EMERGENCY STOW CONTROL UNIT (1).
   - a. Position emergency stow control unit (1) on mounting points and install two washers (2) and screws (3).
   - b. Install two washers (4) and screws (5).



ARR82-27961

INSTALLATION (cont)

4. CONNECT THREE CONNECTORS W4P20 (1), W1P21 (2), AND W3P19 (3).

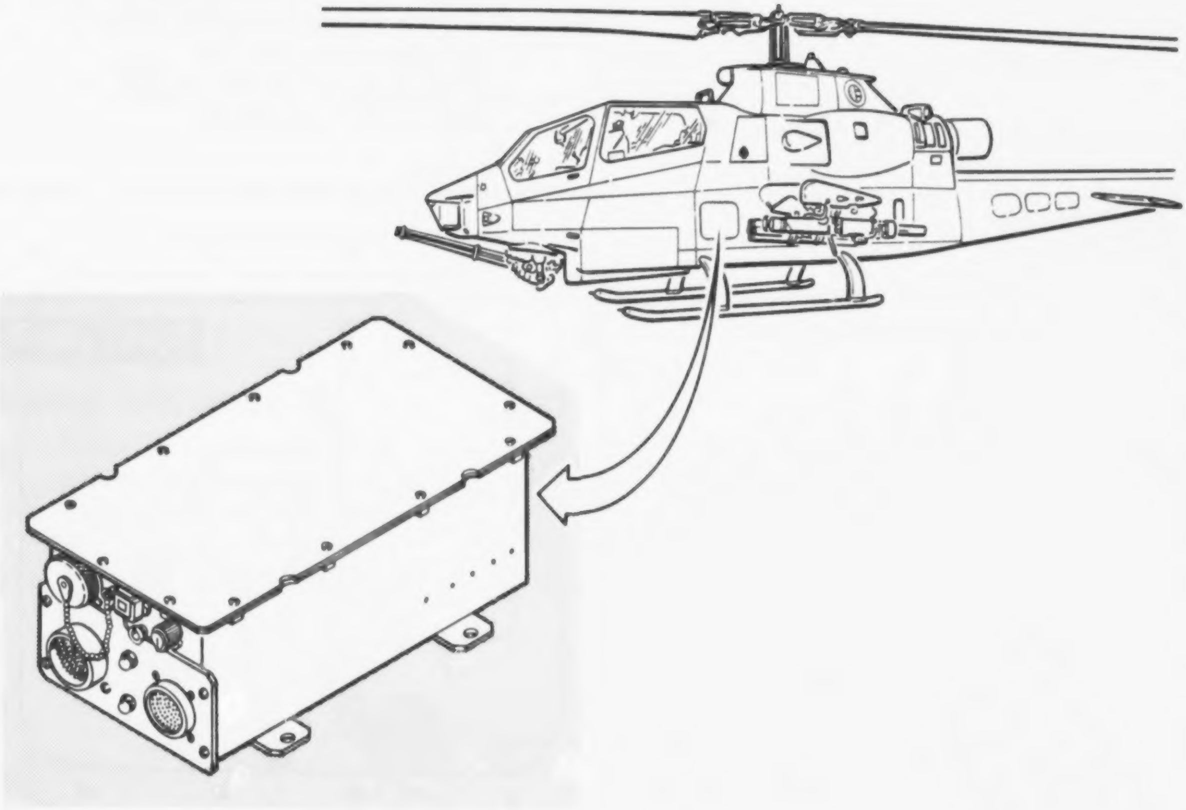

1
2
3
ARR82 27962

END OF TASK

Section XIV. MAINTENANCE OF LOGIC CONTROL UNIT

Section Contents	Para
Removal/Installation of Logic Control Unit	3-65

Removal/Installation of Logic Control Unit 3-65



ARR83-0376

3-65. REMOVAL/INSTALLATION OF LOGIC CONTROL UNIT

DESCRIPTION

This task covers: Removal and installation.

INITIAL SETUP

Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental

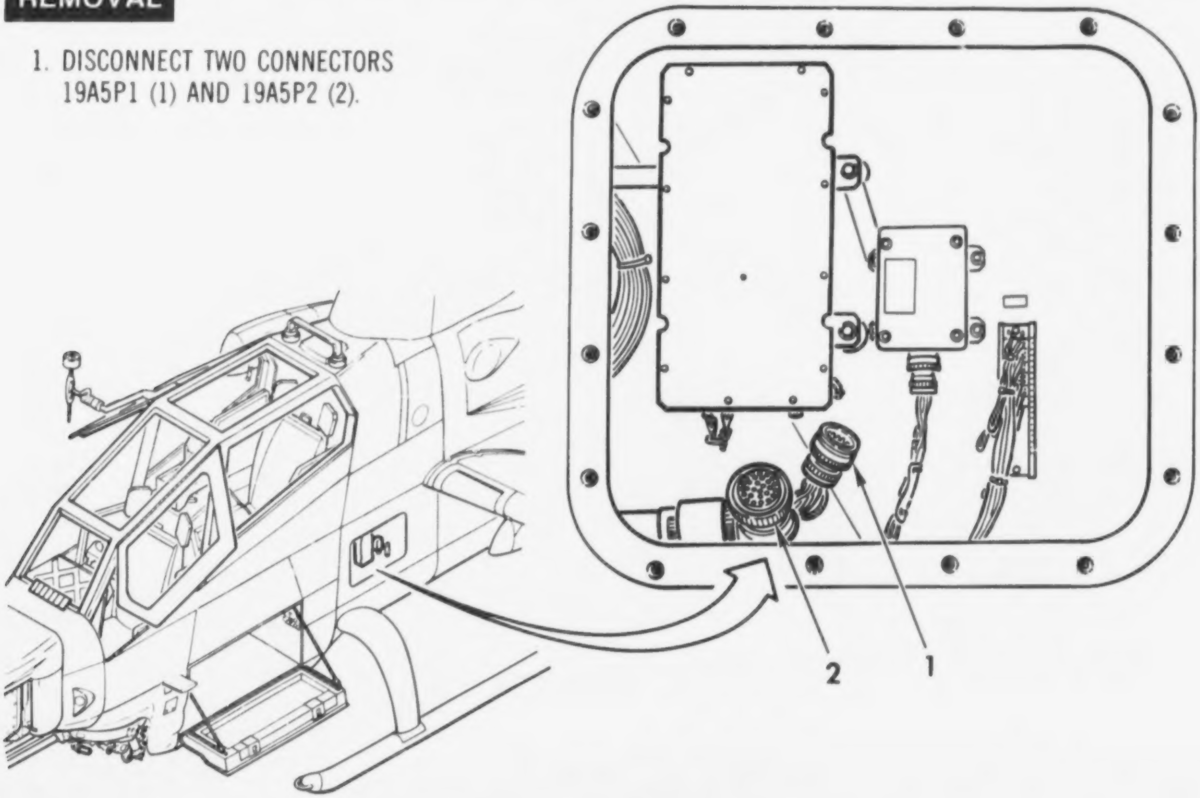
References:
  TM 55-1520-236-23

Personnel Required:
  68J Aircraft Fire Control
    Repairer

Equipment Conditions:
  HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SET-UP performed, para 2-6.
  Left side access panel removed, see TM 55-1520-236-23.

REMOVAL

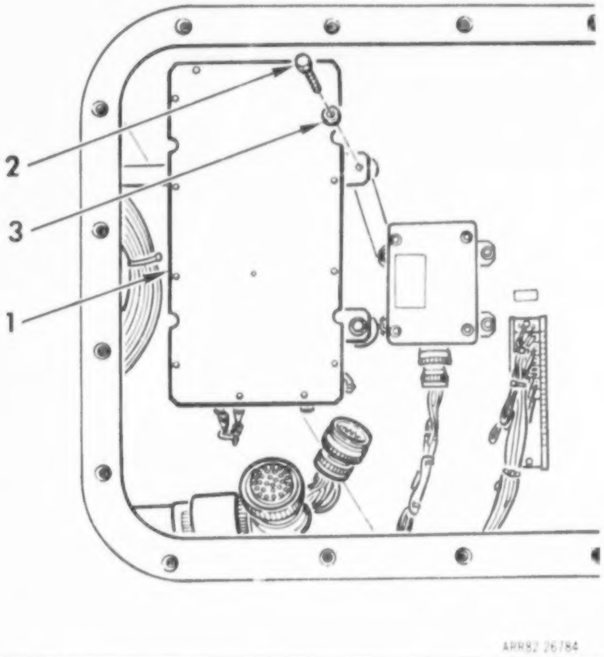
1. DISCONNECT TWO CONNECTORS 19A5P1 (1) AND 19A5P2 (2).



ARR82-26783

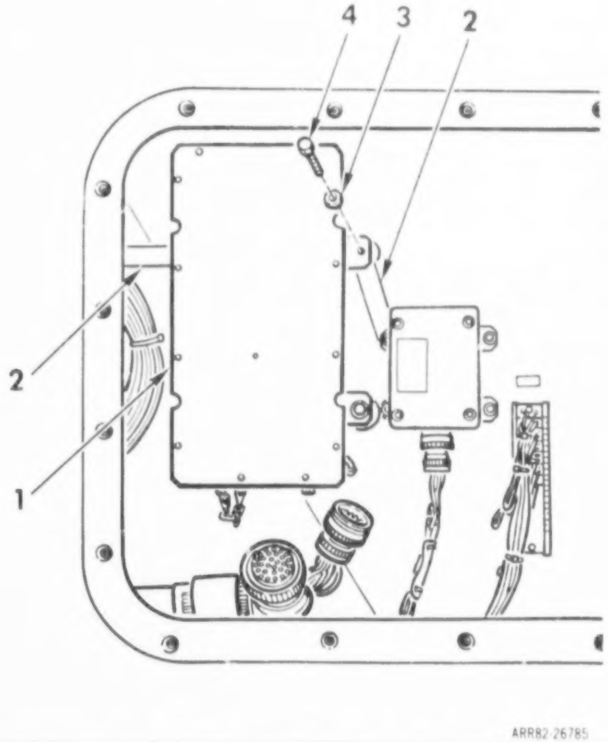
REMOVAL (cont)

2. REMOVE LOGIC CONTROL UNIT (1).
   a. Remove four bolts (2) and four washers (3).
   b. Remove logic control unit (1).



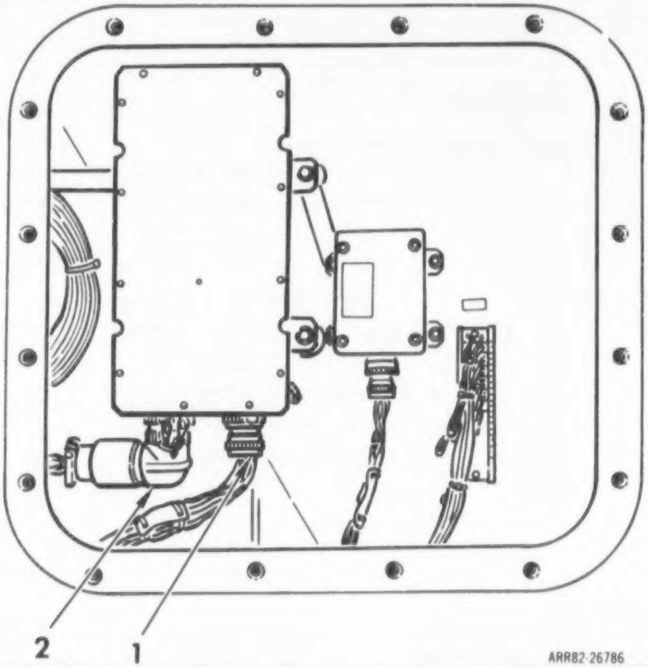
INSTALLATION

3. INSTALL LOGIC CONTROL UNIT (1).
   a. Position logic control unit (1) on bulkhead with ground straps (2) between bulkhead and logic control unit (1).
   b. Install four washers (3) and four bolts (4).



3-65. REMOVAL/INSTALLATION OF LOGIC CONTROL UNIT (cont)

4. CONNECT TWO CONNECTORS 19A5P1 (1) AND 19A5P2 (2).

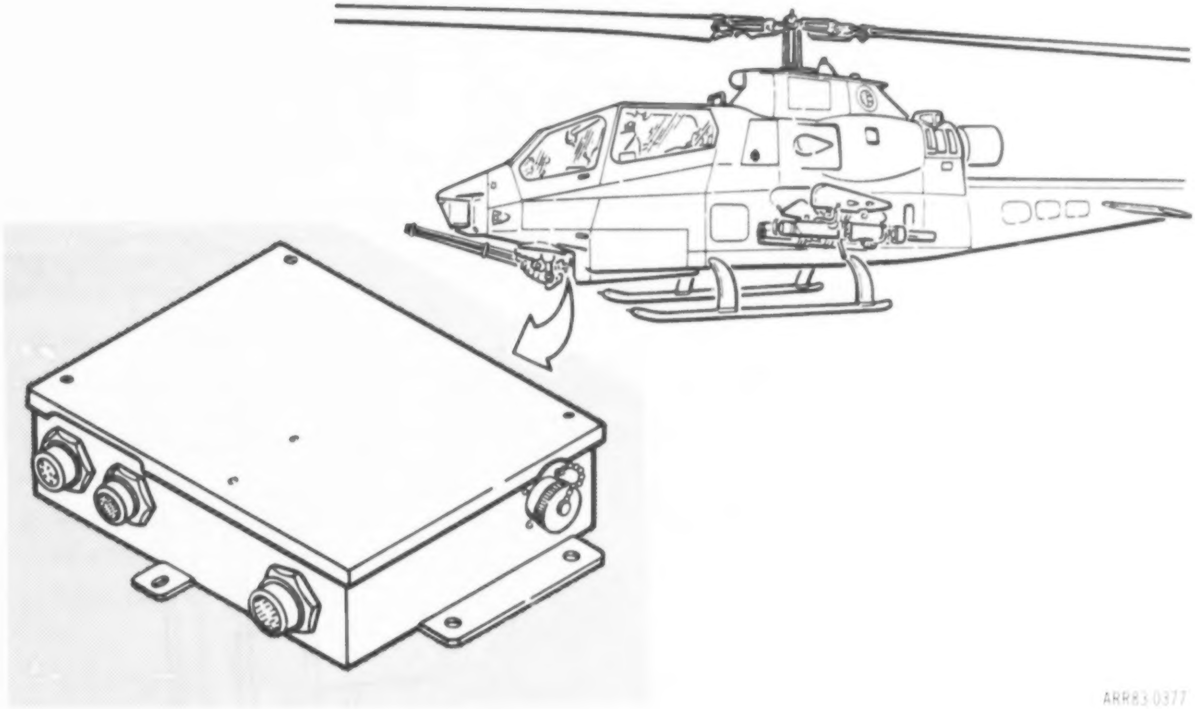

2
1
ARR82-26786

END OF TASK

Section XV. MAINTENANCE OF GUN CONTROL UNIT

Section Contents — Para

Removal/Installation of Gun Control Unit — 3-66



ARR83 0377

3-66. REMOVAL/INSTALLATION OF GUN CONTROL UNIT

DESCRIPTION

This task covers: Removal and installation.

INITIAL SETUP

Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental

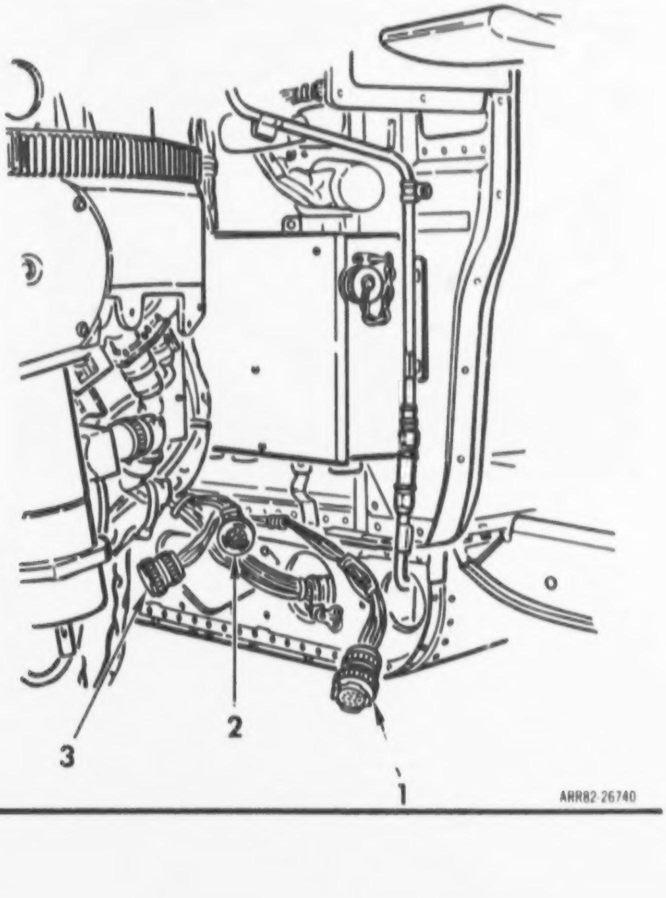
References:
  TM 55-1520-236-23

Personnel Required:
  68J Aircraft Fire Control
    Repairer

Equipment Conditions:
  HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP performed, para 2-6.
  Turret fairing removed, see
    TM 55-1520-236-23.

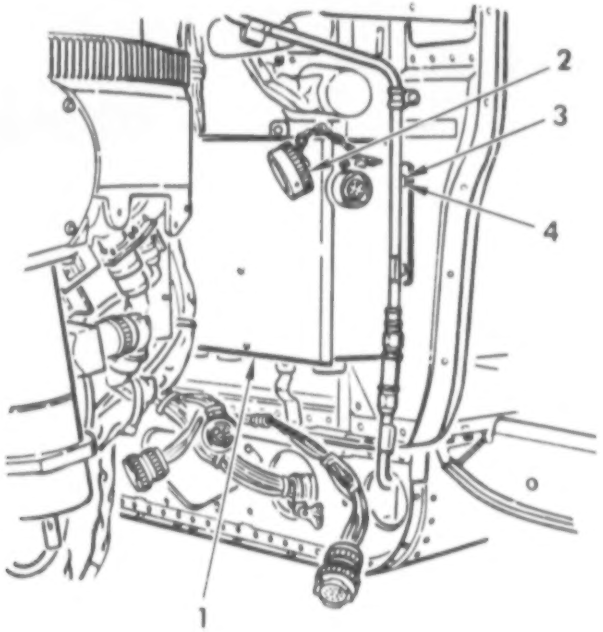
REMOVAL

1. DISCONNECT THREE CONNECTORS 19A4P271 (1), 19A4P249 (2), AND 19A4P270 (3).



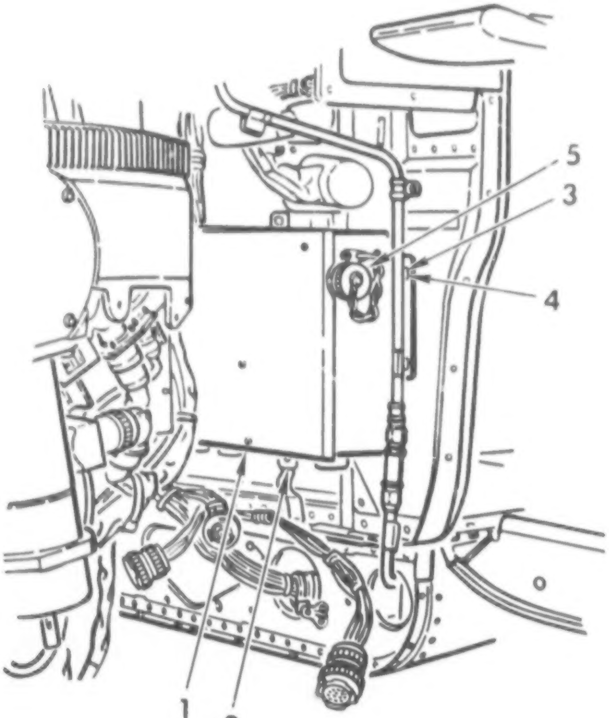
REMOVAL (cont)

2. REMOVE GUN CONTROL UNIT (1).
   - a. Remove cover (2).
   - b. Remove four bolts (3), four washers (4), and gun control unit (1).



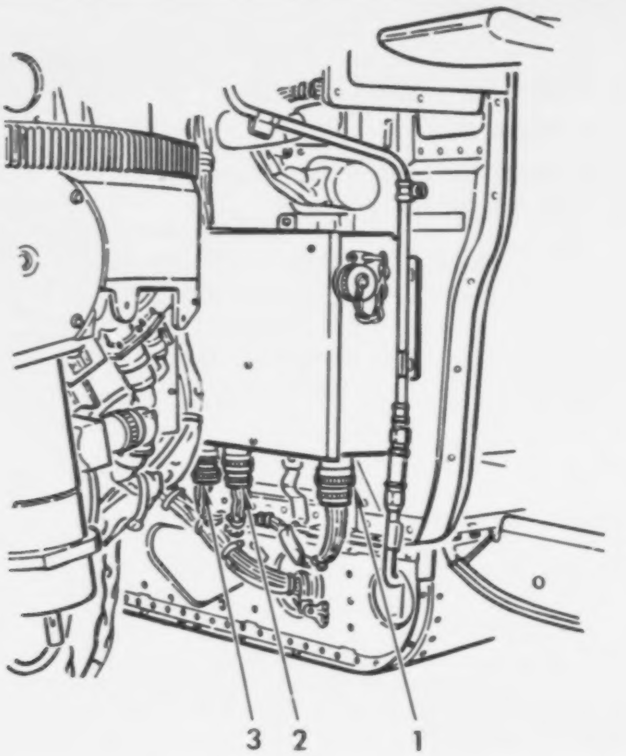
INSTALLATION

3. INSTALL GUN CONTROL UNIT (1).
   - a. Position gun control unit (1) on bulkhead with ground strap (2) between bulkhead and gun control unit.
   - b. Install four washers (3), and four bolts (4).
   - c. Install cover (5).



3-66. REMOVAL/INSTALLATION OF GUN CONTROL UNIT (cont)

4. CONNECT THREE CONNECTORS 9A4P271 (1), 19A4P249 (2), AND 19A4P270 (3).

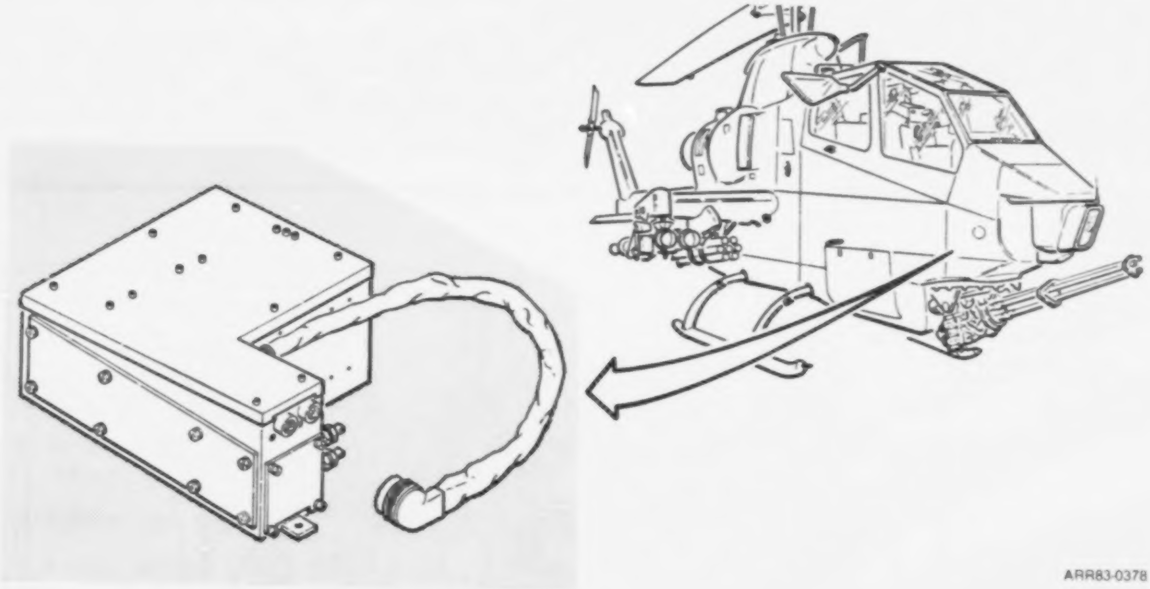


ARR82 26743

END OF TASK

Section XVI. MAINTENANCE OF TURRET CONTROL UNIT

Section Contents	Para
Removal/Installation of Turret Control Unit	3-67



best copy available

3-67. REMOVAL/INSTALLATION OF TURRET CONTROL UNIT

DESCRIPTION

This task covers: Removal and installation.

INITIAL SETUP

Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental

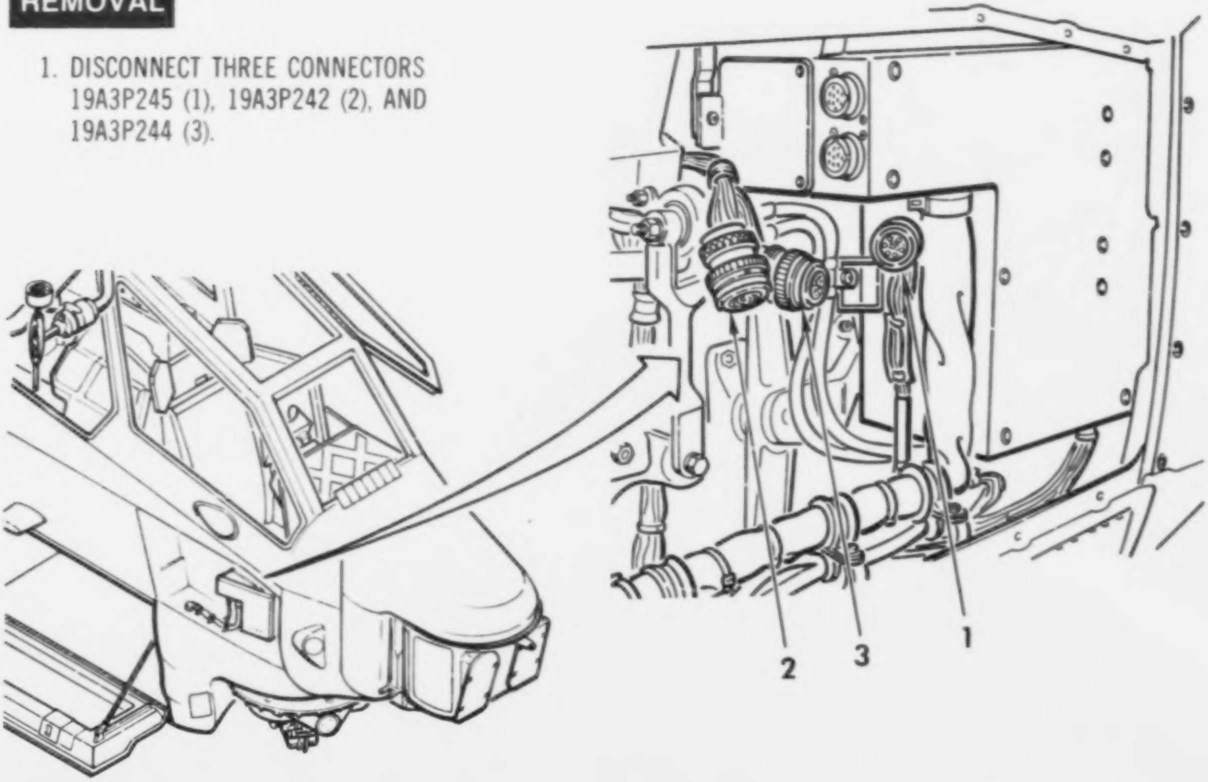
References:
  TM 55-1520-236-23

Personnel Required:
  68J Aircraft Fire Control
    Repairer

Equipment Conditions:
  HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP performed, para 2-6.
  Forward right hand outer panel removed, see TM 55-1520-236-23.

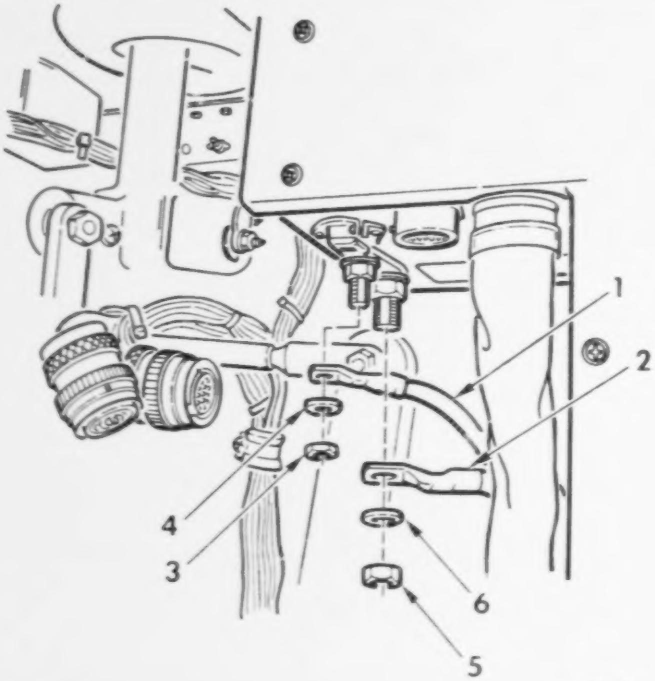
REMOVAL

1. DISCONNECT THREE CONNECTORS 19A3P245 (1), 19A3P242 (2), AND 19A3P244 (3).



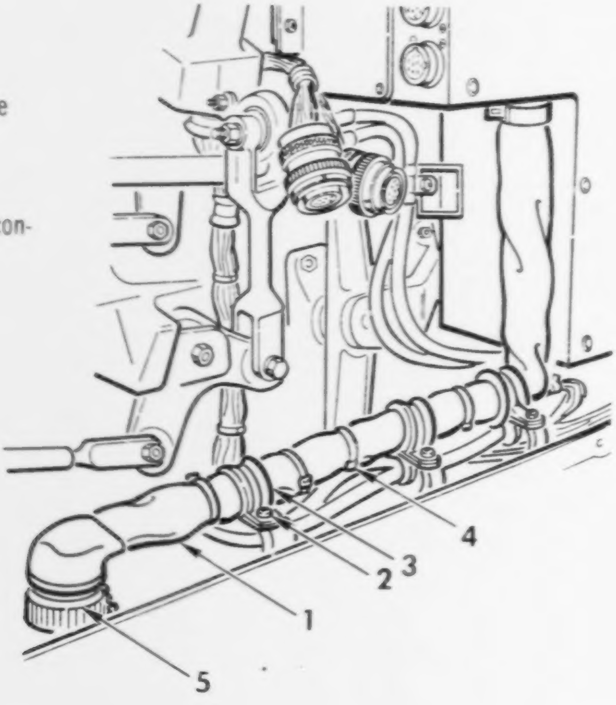
REMOVAL (cont)

2. REMOVE TWO LEADS A163B4 (1) AND A162A4N (2).
   1. Remove nut (3), lockwasher (4), and lead (1).
   2. Remove nut (5), lockwasher (6), and lead (2).



ARR82-26774

3. REMOVE CABLE ASSEMBLY (1).
   1. Remove three screws (2) and three clamps (3).
   2. Remove cable ties (4).
   3. Remove lockwire and disconnect connector (5).

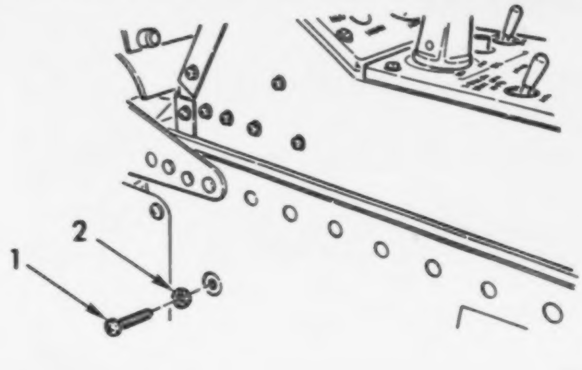


ARR82-26775

3-67. REMOVAL/INSTALLATION OF TURRET CONTROL UNIT (cont)

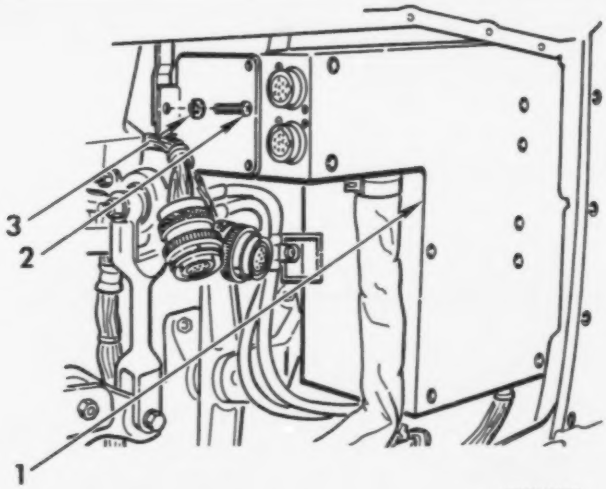
4. REMOVE THE FOLLOWING IN GUNNER COCKPIT:

   SCREW (1)
   WASHER (2)



ARR82-26776

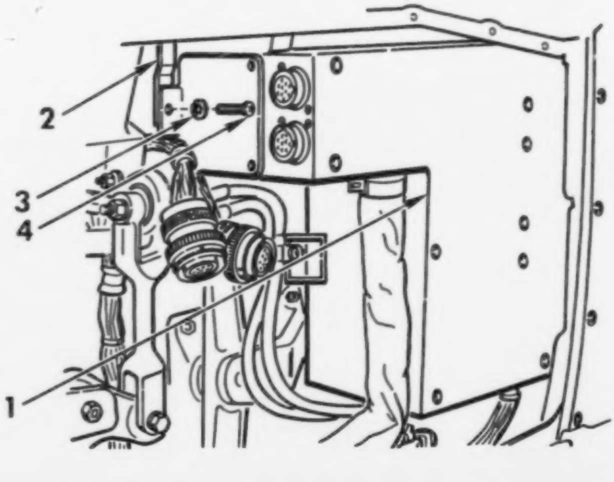
5. REMOVE TURRET CONTROL UNIT (1).
   a. Remove four screws (2) and four washers (3).
   b. Remove turret control unit (1).



ARR82-26777

INSTALLATION

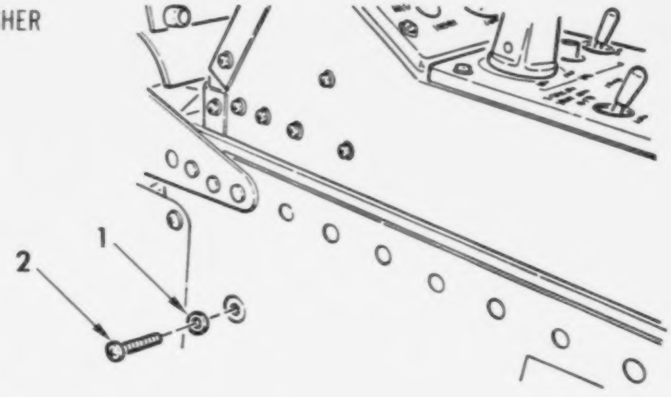
6. INSTALL TURRET CONTROL UNIT (1).
   a. Position turret control unit (1) on bulkhead with ground strap (2) between bulkhead and turret control unit.
   b. Install four washers (3) and four screws (4).



ARR82-26778

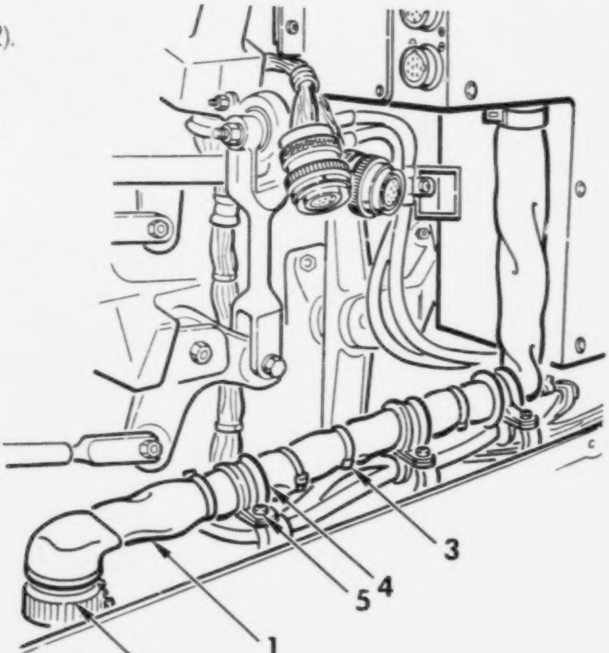
INSTALLATION (cont)

7. IN GUNNER COCKPIT, INSTALL WASHER (1) AND SCREW (2).



ARR82-26779

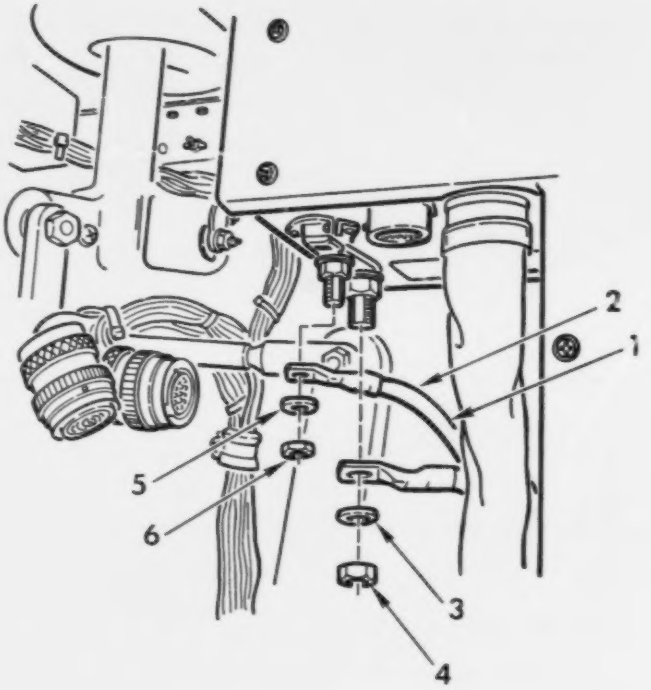
8. INSTALL CABLE ASSEMBLY (1).
   a. Connect and lockwire connector (2).
   b. Install cable ties (3).
   c. Install three clamps (4) and three screws (5).



ARR82-26780

3-67. REMOVAL/INSTALLATION OF TURRET CONTROL UNIT (cont)

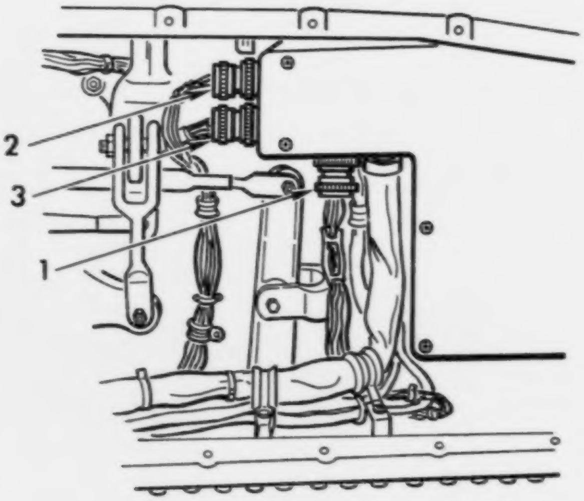
9. INSTALL TWO LEADS A162A4N (1) AND A163B4 (2).
   a. Install lead (1), washer (3), and nut (4).
   b. Install lead (2), washer (5), and nut (6).



ARR82-26781

10. CONNECT THE FOLLOWING CONNECTORS:

    19A3P245 (1)
    19A3P242 (2)
    19A3P244 (3)



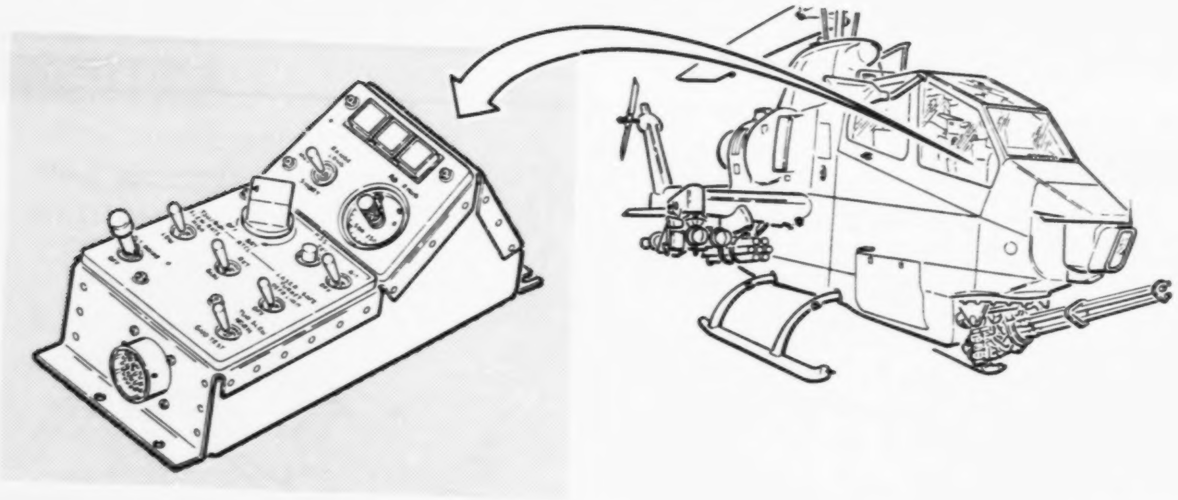
ARR82-26782

END OF TASK

Section XVII. MAINTENANCE OF GUNNER ARMAMENT CONTROL PANEL

Section Contents

	Para
Removal/Installation of Gunner Armament	3-68



ARR83-0379

3-68. REMOVAL/INSTALLATION OF GUNNER ARMAMENT CONTROL PANEL

DESCRIPTION

This task covers: Removal and installation.

INITIAL SETUP

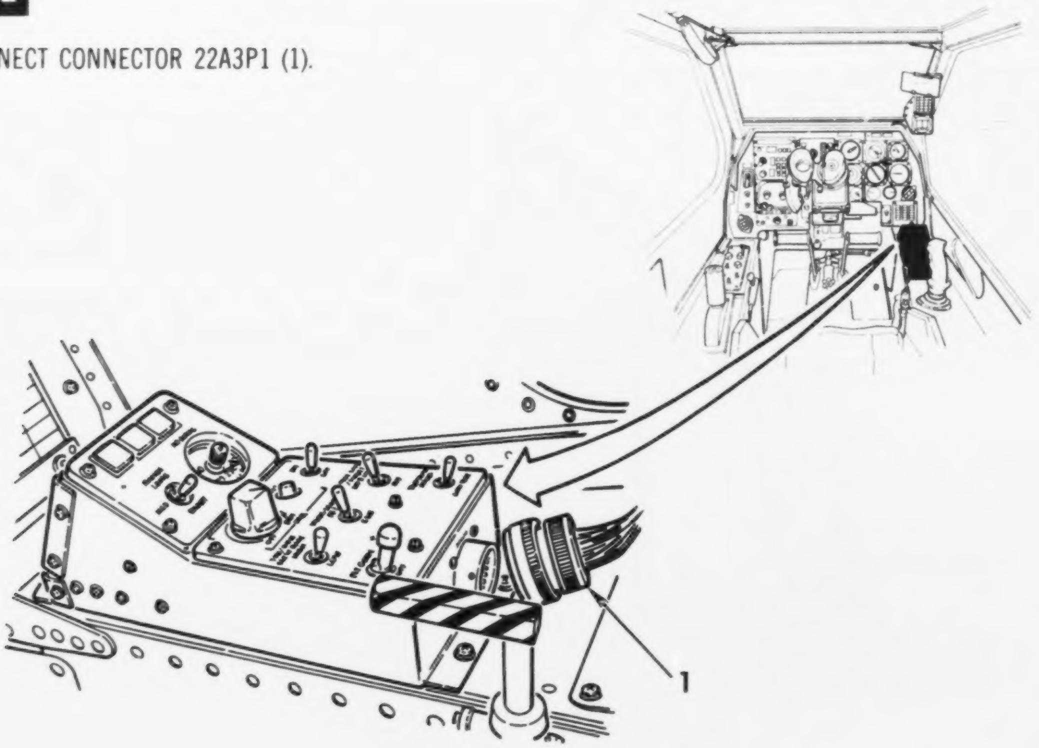
Tools/Test and Support Equipment:
- Tool Set, A/C Armament Repairman: Basic
- Tool Set, A/C Armament Repairman: Supplemental

Personnel Required:
- 68J Aircraft Fire Control Repairer

Equipment Conditions:
- HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SET-UP performed, para 2-6.

REMOVAL

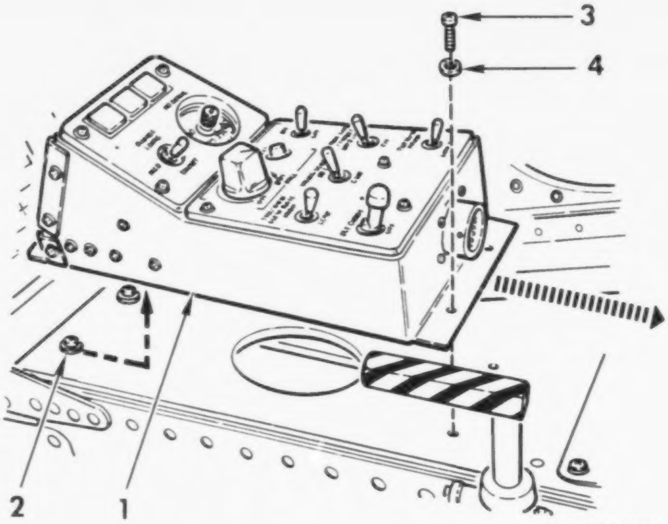
1. DISCONNECT CONNECTOR 22A3P1 (1).



ARR82-26803

REMOVAL (cont)

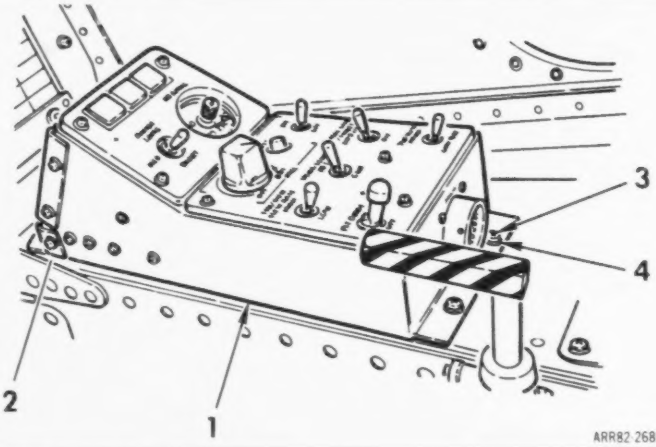
2. REMOVE GUNNER ARMAMENT CONTROL PANEL (1).
   - a. Loosen two screws (2).
   - b. Remove two screws (3) and two washers (4).
   - c. Slide gunner armament control panel (1) back and remove.



ARR82-26804

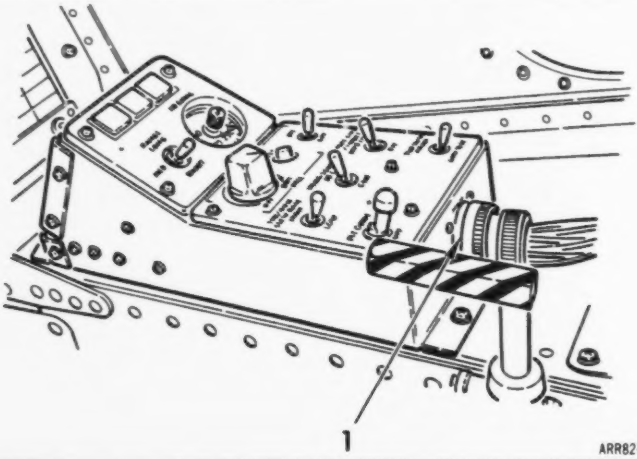
INSTALLATION

3. INSTALL GUNNER ARMAMENT CONTROL PANEL (1).
   - a. Position gunner armament control panel (1) on mounting surface and tighten two screws (2).
   - b. Install two screws (3) and two washers (4).



ARR82-26805

4. CONNECT CONNECTOR 22A3P1 (1).



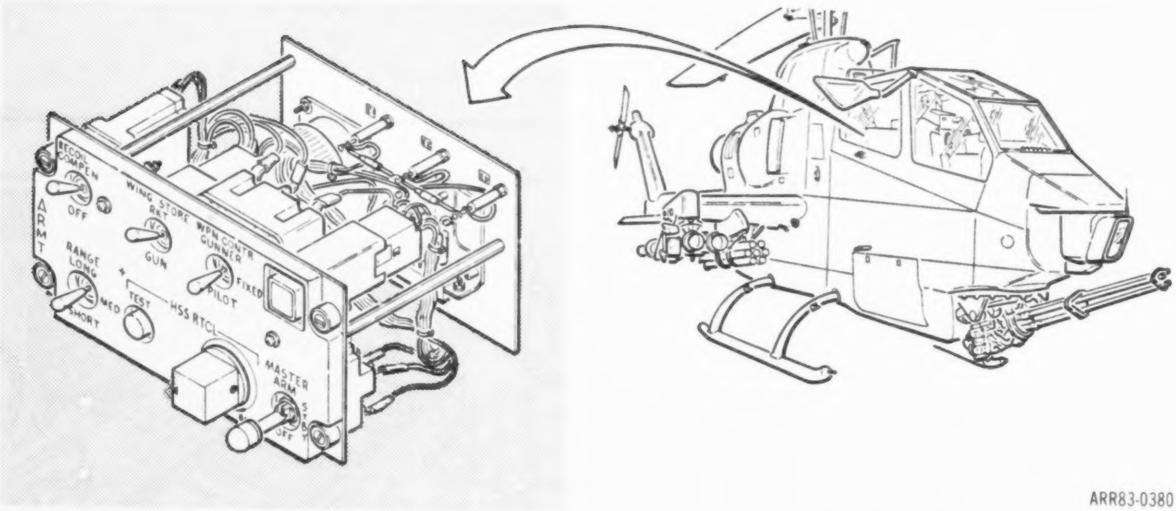
ARR82-26806

END OF TASK

Section XVIII. MAINTENANCE OF PILOT ARMAMENT CONTROL PANEL

Section Contents

	Para
Removal/Installation of Pilot Armament Control Panel	3-69


RECOIL COMPEN
OFF
ARMT
WING STORE RKT
GUN
WPN CNTR GUNNER
FIXED
PILOT
RANGE LONG
MED
SHORT
TEST
HSS RTCL
MASTER ARM
STBY
OFF
ARR83-0380

3-69. REMOVAL/INSTALLATION OF PILOT ARMAMENT CONTROL PANEL

DESCRIPTION

This task covers: Removal and installation.

INITIAL SETUP

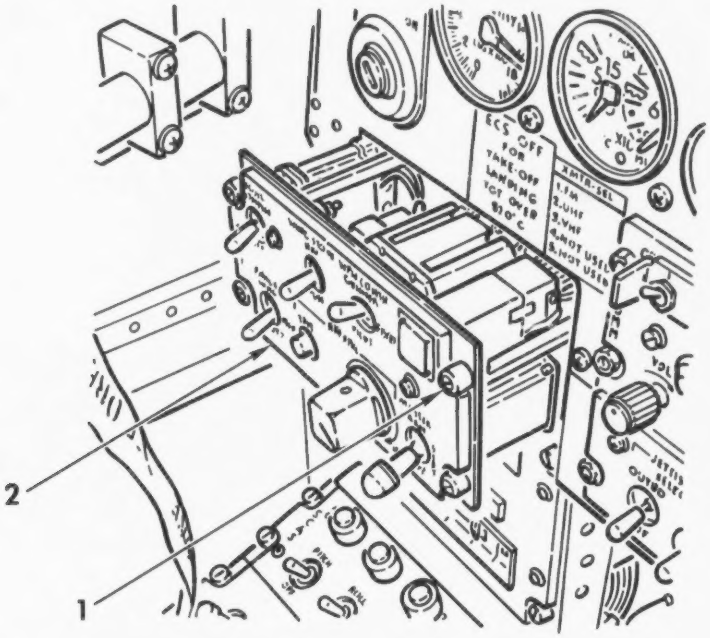
Tools/Test and Support Equipment:
Tool Set, A/C Armament
Repairman: Basic
Tool Set, A/C Armament
Repairman: Supplemental

Personnel Required:
68J Aircraft Fire Control
Repairer

Equipment Conditions:
HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SET-UP performed, para 2-6.

REMOVAL

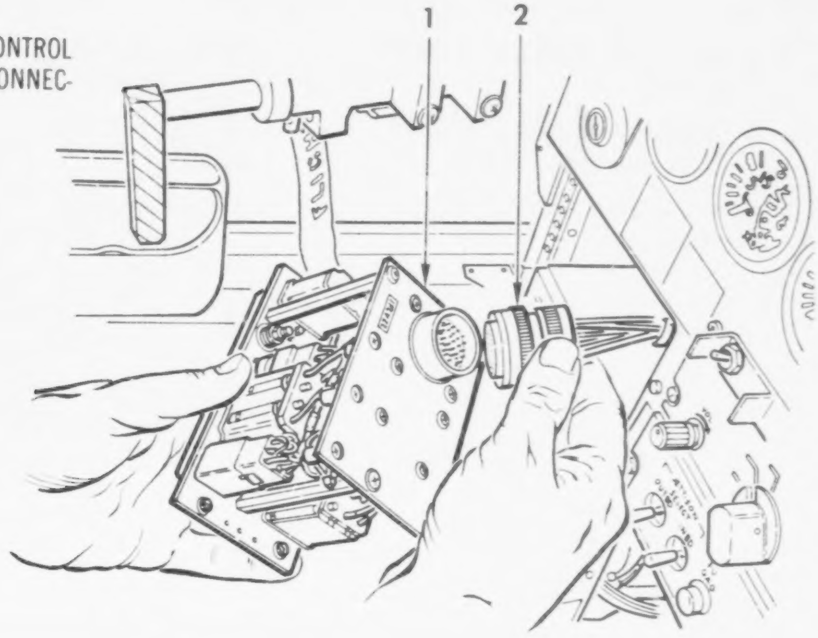
1. RELEASE FOUR TURN LOCK STUD ASSEMBLIES (1) AND PULL PILOT ARMAMENT CONTROL PANEL (2) AWAY FROM MOUNT.


2
1
ECS OFF FOR TAKE-OFF LANDING TGT OVER 810° C
XMTR-SEL
1.FM
2.UHF
3.VHF
4.NOT USED
5.NOT USED

ARR82-26799

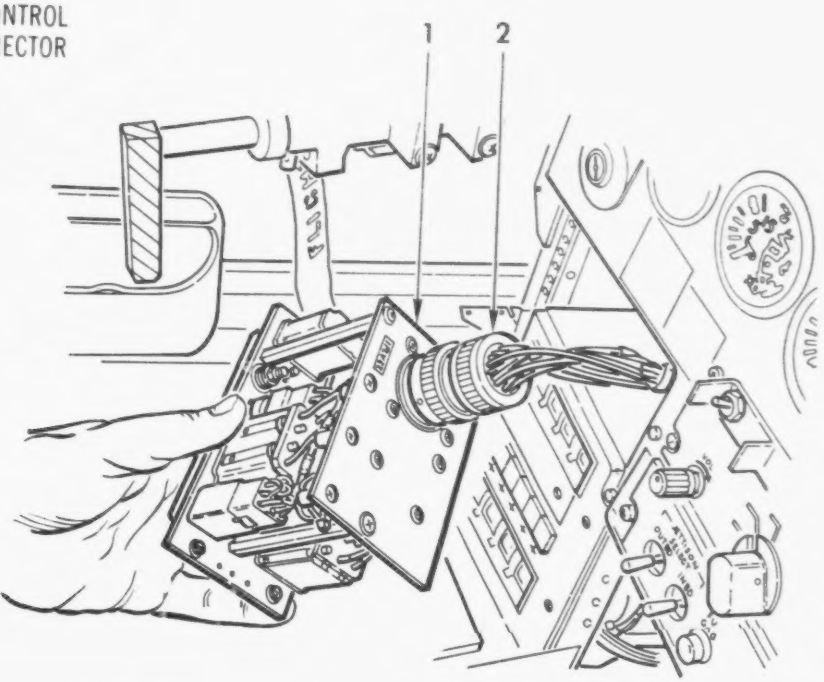
REMOVAL (cont)

2. SUPPORT PILOT ARMAMENT CONTROL PANEL (1) AND DISCONNECT CONNECTOR 22A2P1 (2).


1
2
ARR82-26800

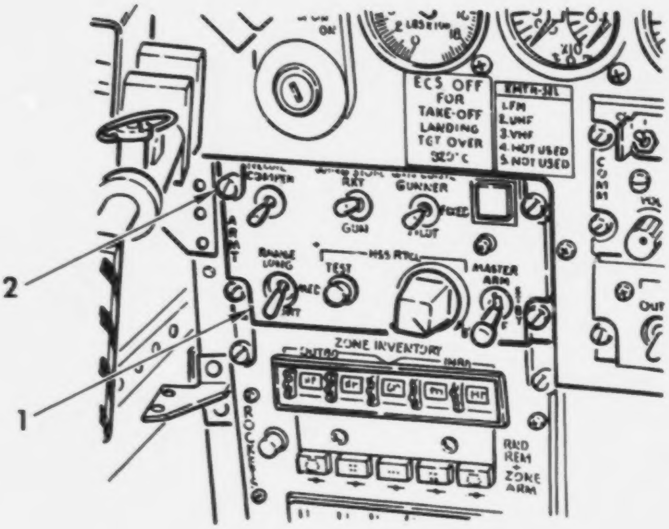
INSTALLATION

3. SUPPORT PILOT ARMAMENT CONTROL PANEL (1) AND CONNECT CONNECTOR 22A2P1 (2).


1
2
ARR82-26801

3-69. REMOVAL/INSTALLATION OF PILOT ARMAMENT CONTROL PANEL (cont)

4. INSTALL PILOT ARMAMENT CONTROL PANEL (1).
   a. Slide pilot armament control panel (1) into position on mount.
   b. Secure four turn lock stud assemblies (2).


2
1
ECS OFF
FOR
TAKE-OFF
LANDING
TGT OVER
GUNNER
GUN
PILOT
TEST
MASTER
ARM
ZONE INVENTORY
ROCKETS
RND
REM
ZONE
ARM

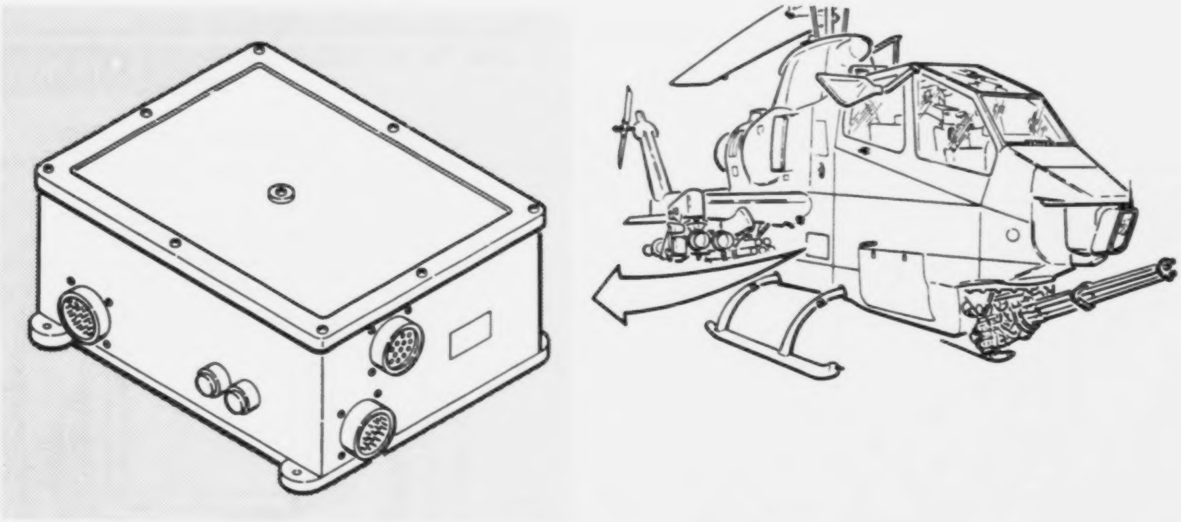
ARR82-26802

END OF TASK

Section XIX. MAINTENANCE OF INTERFACE CONTROL UNIT

Section Contents | Para

Removal/Installation of Interface Control Unit 3-70



ARR83-0381

3-70. REMOVAL/INSTALLATION OF INTERFACE CONTROL UNIT

DESCRIPTION

This task covers: Removal and installation.

INITIAL SETUP

Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental

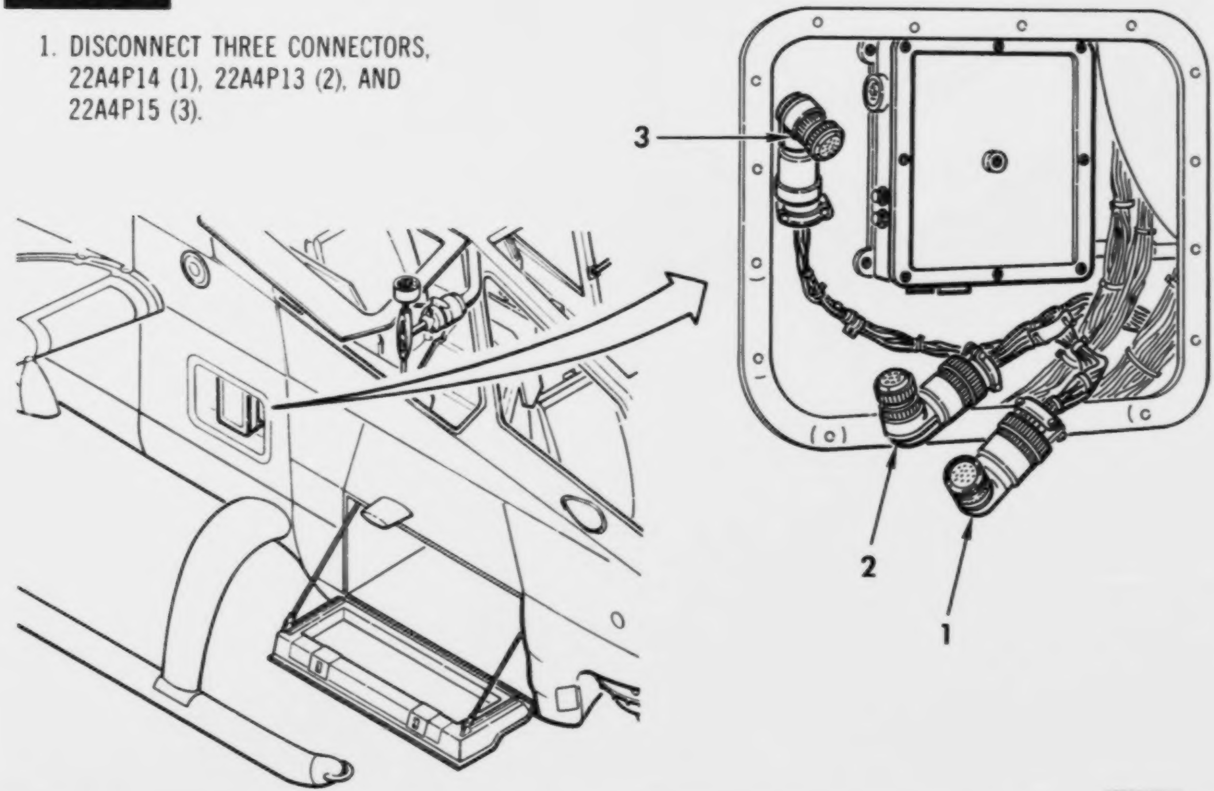
References:
  TM 55-1520-236-23

Personnel Required:
  68J Aircraft Fire Control
    Repairer

Equipment Conditions:
  HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SETUP performed, para 2-6.
  Right side access panel removed, see TM 55-1520-236-23.

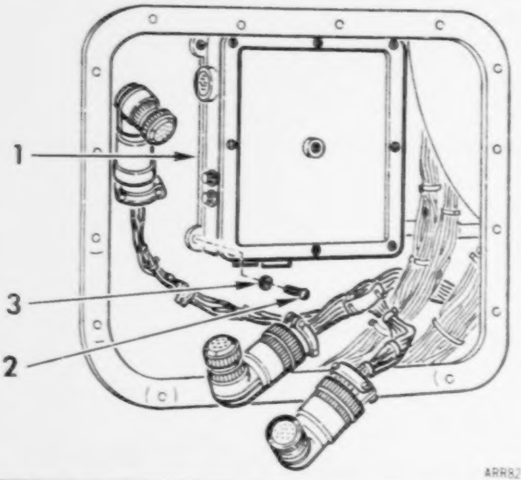
REMOVAL

1. DISCONNECT THREE CONNECTORS, 22A4P14 (1), 22A4P13 (2), AND 22A4P15 (3).



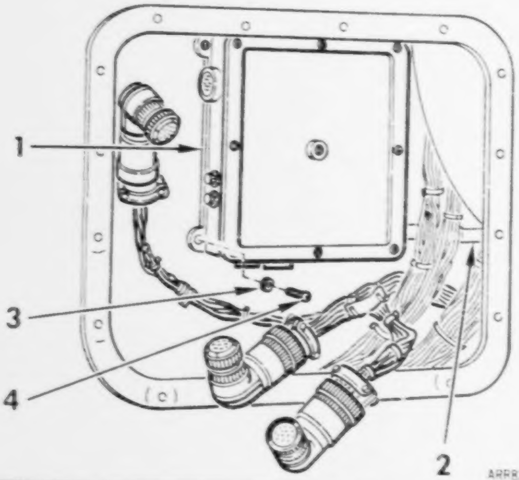
REMOVAL (cont)

2. REMOVE INTERFACE CONTROL UNIT (1).
   a. Remove four screws (2) and four washers (3).
   b. Remove interface control unit (1).


1
3
2
ARR82 26788

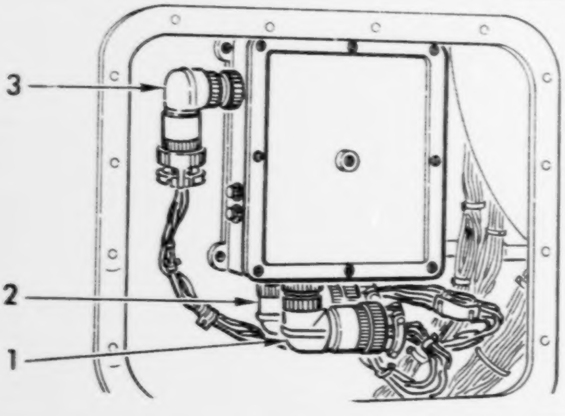
INSTALLATION

3. INSTALL INTERFACE CONTROL UNIT (1).
   a. Position interface control unit (1) on bulkhead with ground straps (2) between interface control unit and bulkhead.
   b. Install four washers (3) and four screws (4).


1
3
4
2
ARR82 26789

4. CONNECT THE FOLLOWING CONNECTORS:

   22A4P14 (1)
   22A4P13 (2)
   22A4P15 (3)

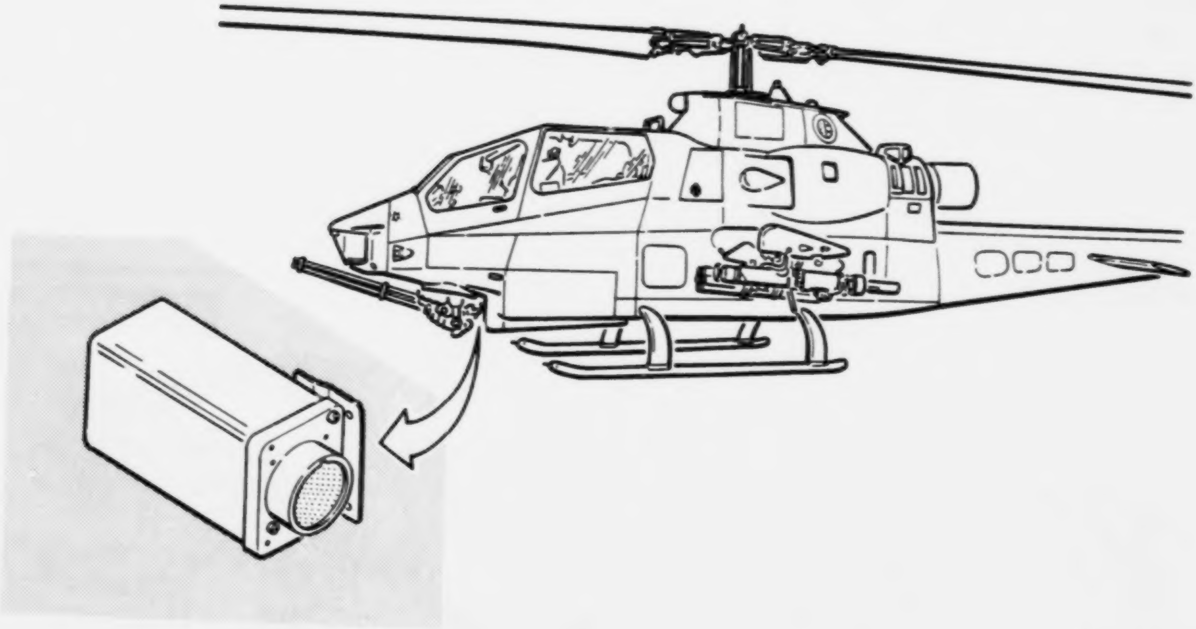

3
2
1
ARR82 26790

END OF TASK

Section XX. MAINTENANCE OF TURRET BUFFER AMPLIFIER

Section Contents

	Para
Removal/Installation of Turret Buffer Amplifier	3-71



ARR83-0382

3-71. REMOVAL/INSTALLATION OF TURRET BUFFER AMPLIFIER

DESCRIPTION

This task covers: Removal and installation.

INITIAL SETUP

Tools/Test and Support Equipment:
Tool Set, A/C Armament
Repairman: Basic
Tool Set, A/C Armament
Repairman: Supplemental

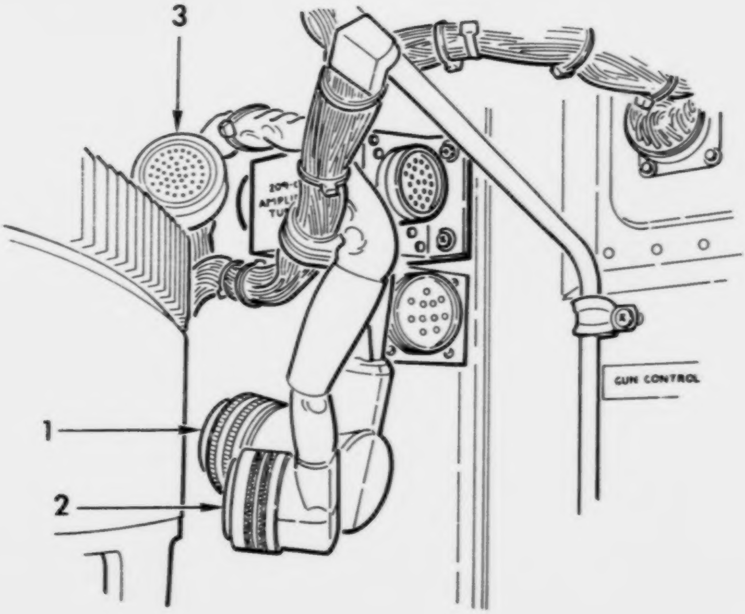
Personnel Required:
68J Aircraft Fire Control
Repairer

Equipment Conditions:
Gun control unit removed, see
REMOVAL/INSTALLATION OF
GUN CONTROL UNIT, para 2-6.

REMOVAL

1. DISCONNECT THE FOLLOWING CONNECTORS:

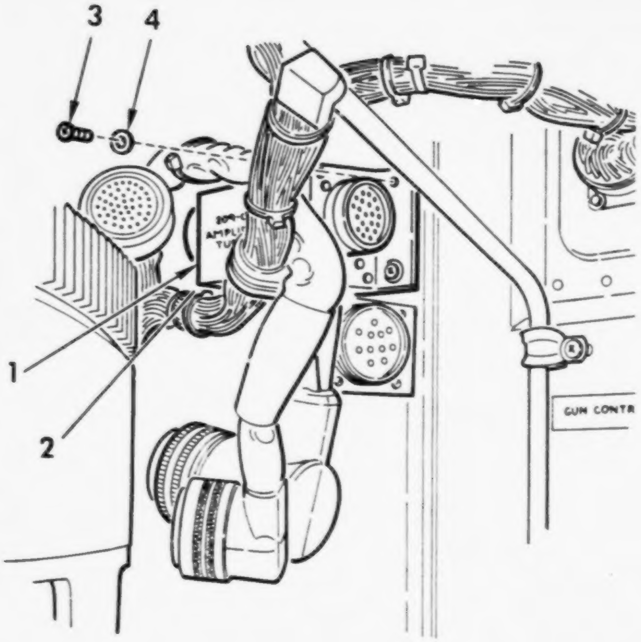
W3P1 (1)
W1P3 (2)
19A7P1 (3)



ARR82 27955

REMOVAL (cont)

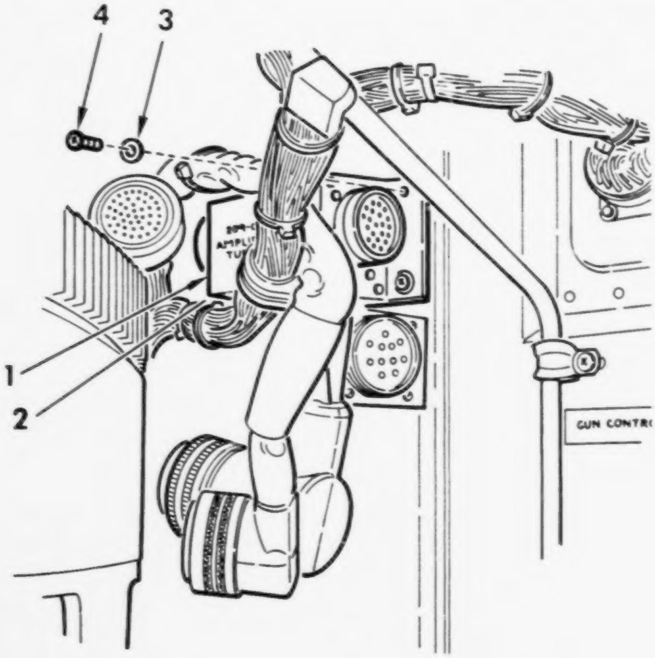
2. REMOVE TURRET BUFFER AMPLIFIER (1).
   a. Loosen screw (2).
   b. Remove two screws (3) and two washers (4).
   c. Remove turret buffer amplifier (1).



ARR82-27956

INSTALLATION

3. INSTALL TURRET BUFFER AMPLIFIER (1).
   a. Position turret buffer amplifier (1) in position on bulkhead and tighten screw (2).
   b. Install two washers (3) and two screws (4).

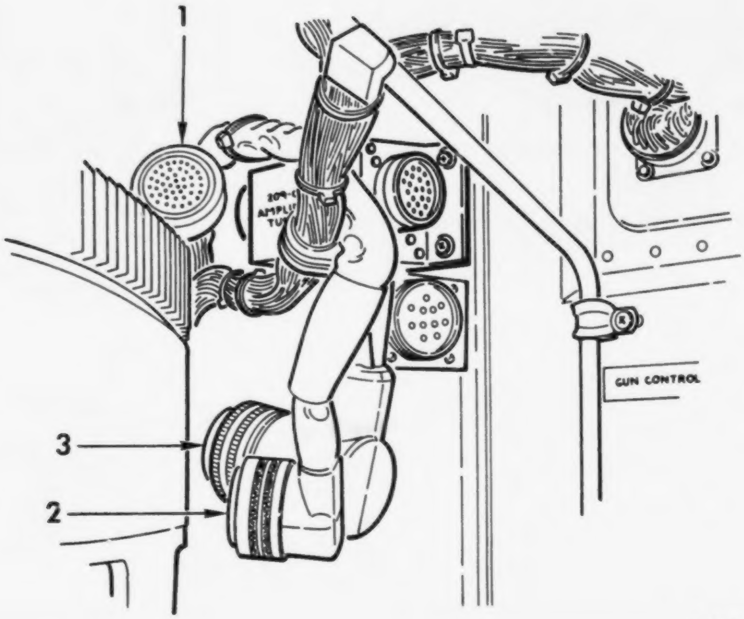


ARR82-27957

3-71. REMOVAL/INSTALLATION OF TURRET BUFFER AMPLIFIER (cont)

4. CONNECT THE FOLLOWING CONNECTORS:

   19A7P1 (1)
   W1P3 (2)
   W3P1 (3)



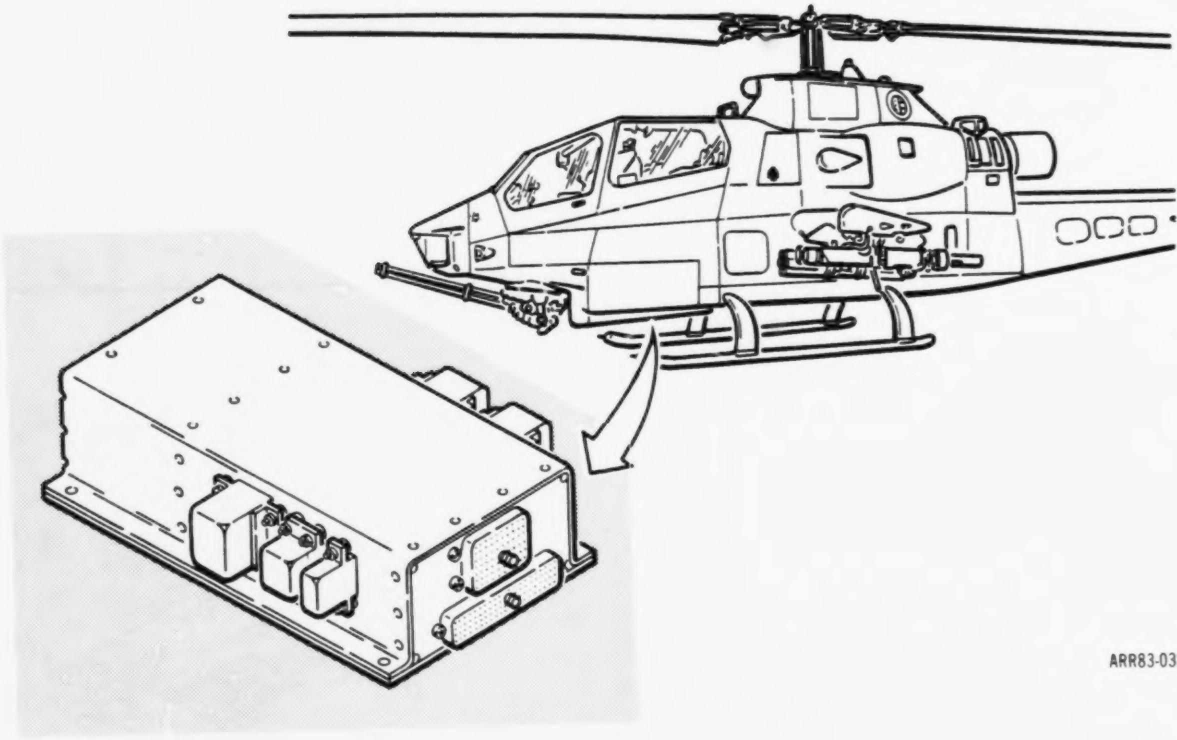
ARR82-27958

END OF TASK

Section XXI. MAINTENANCE OF LOGIC RELAY ASSEMBLY

Section Contents — Para

Removal/Installation of Logic Relay Assembly 3-72



ARR83-0383

3-72. REMOVAL/INSTALLATION OF LOGIC RELAY ASSEMBLY

DESCRIPTION

This task covers: Removal and installation.

INITIAL SETUP

Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental

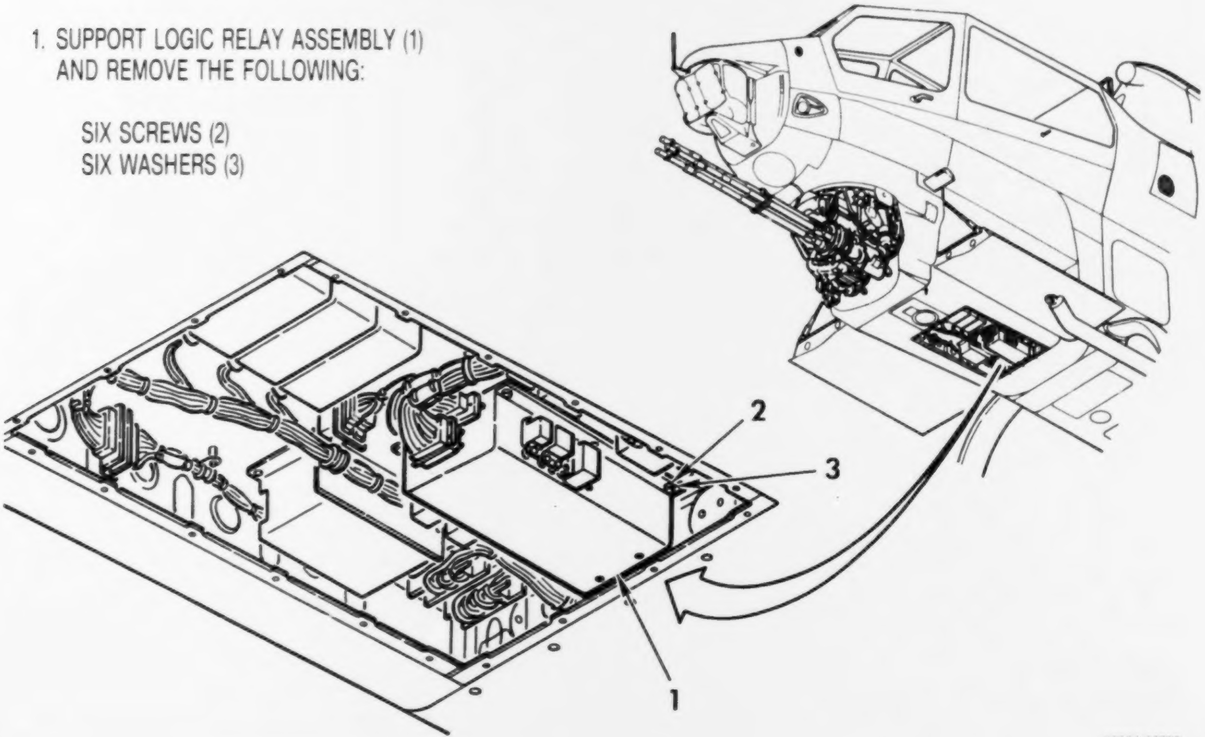
References:
  TM 55-1520-236-23

Personnel Required:
  68J Aircraft Fire Control
    Repairer

Equipment Conditions:
  HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SET-UP performed, para 2-6.
  Bottom access panel removed.
    See TM 55-1520-236-23.

1. SUPPORT LOGIC RELAY ASSEMBLY (1) AND REMOVE THE FOLLOWING:

   SIX SCREWS (2)
   SIX WASHERS (3)



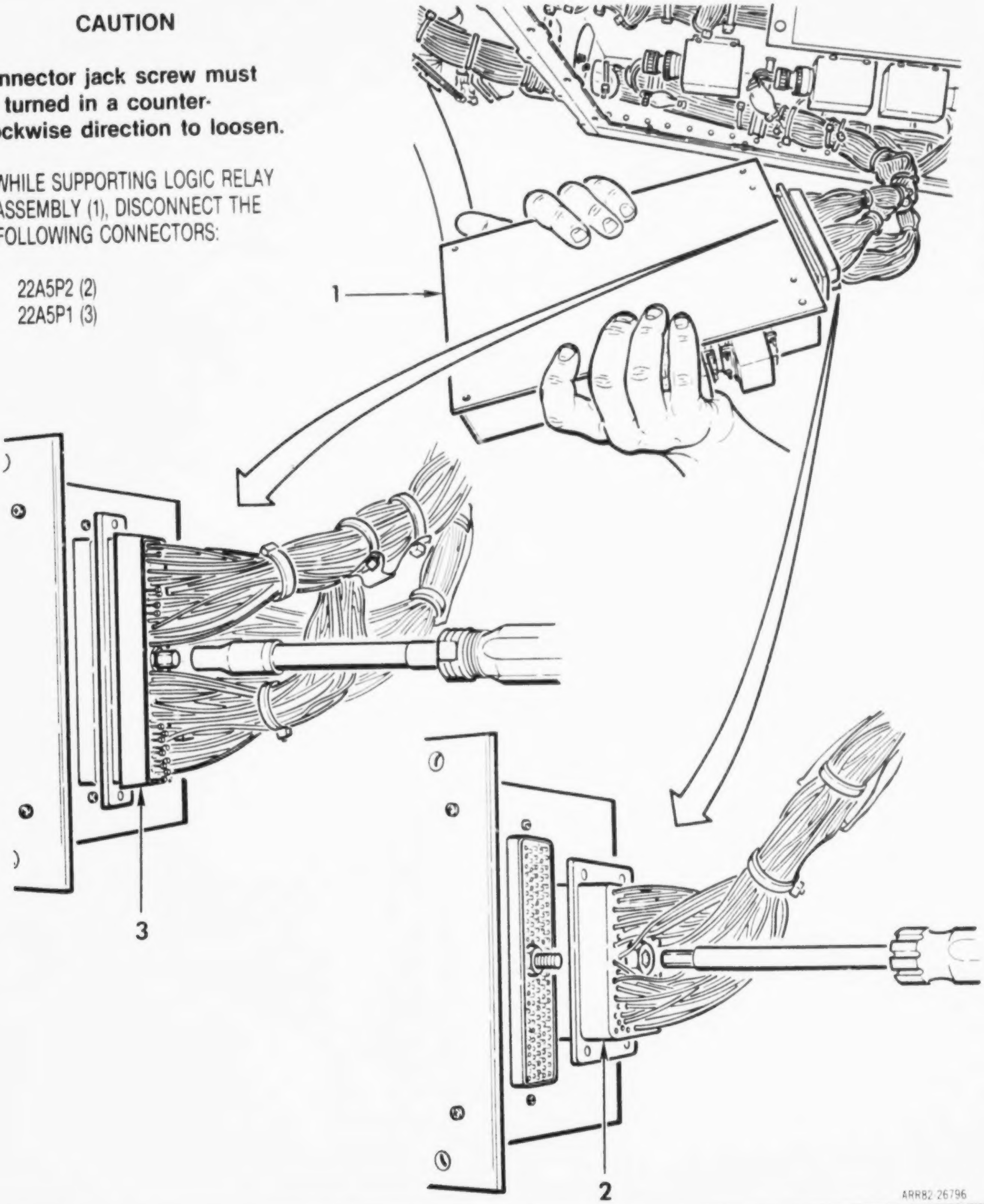
REMOVAL (cont)

CAUTION

Connector jack screw must be turned in a counter-clockwise direction to loosen.

2. WHILE SUPPORTING LOGIC RELAY ASSEMBLY (1), DISCONNECT THE FOLLOWING CONNECTORS:

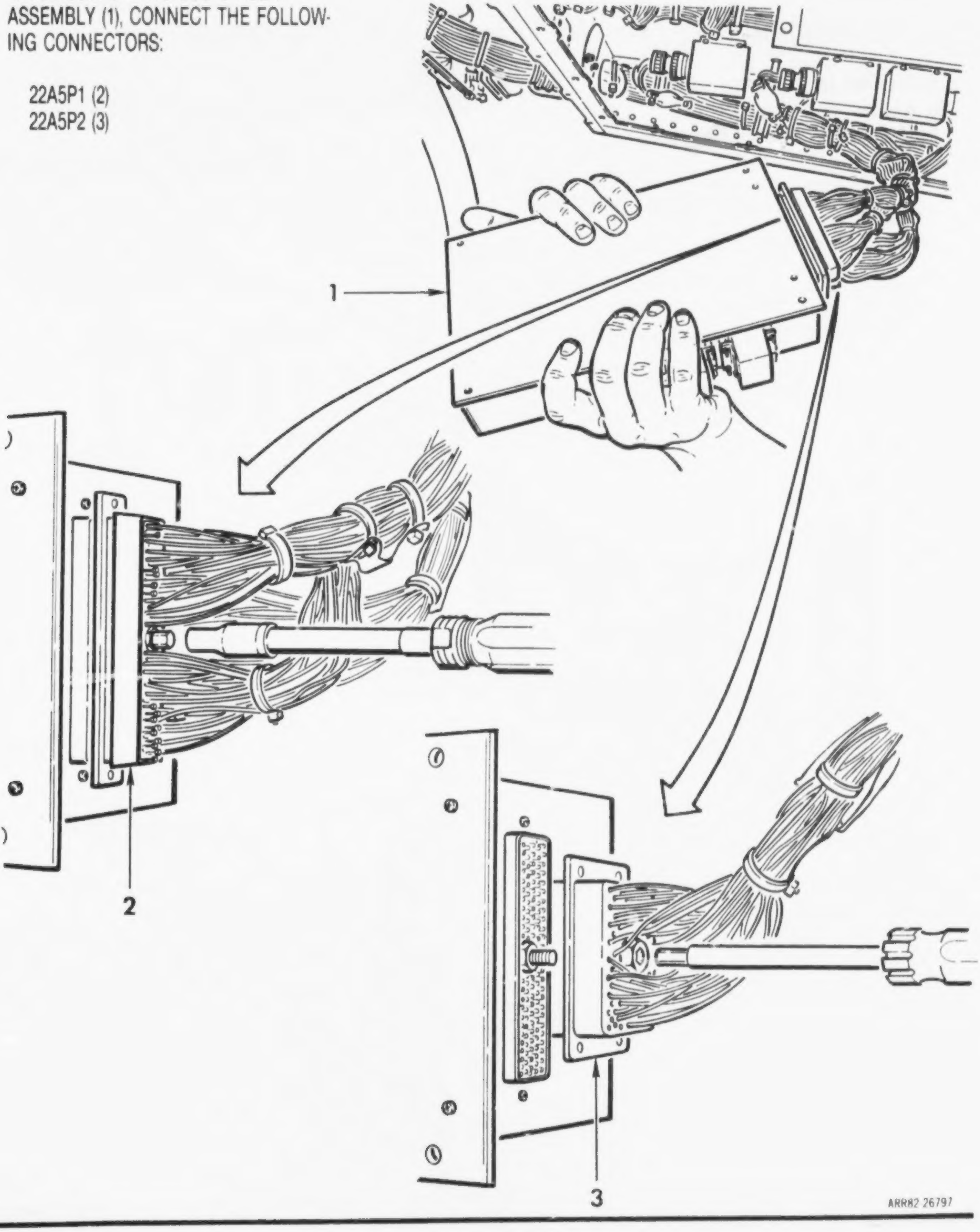
22A5P2 (2)
22A5P1 (3)



3-72. REMOVAL/INSTALLATION OF LOGIC RELAY ASSEMBLY (cont)

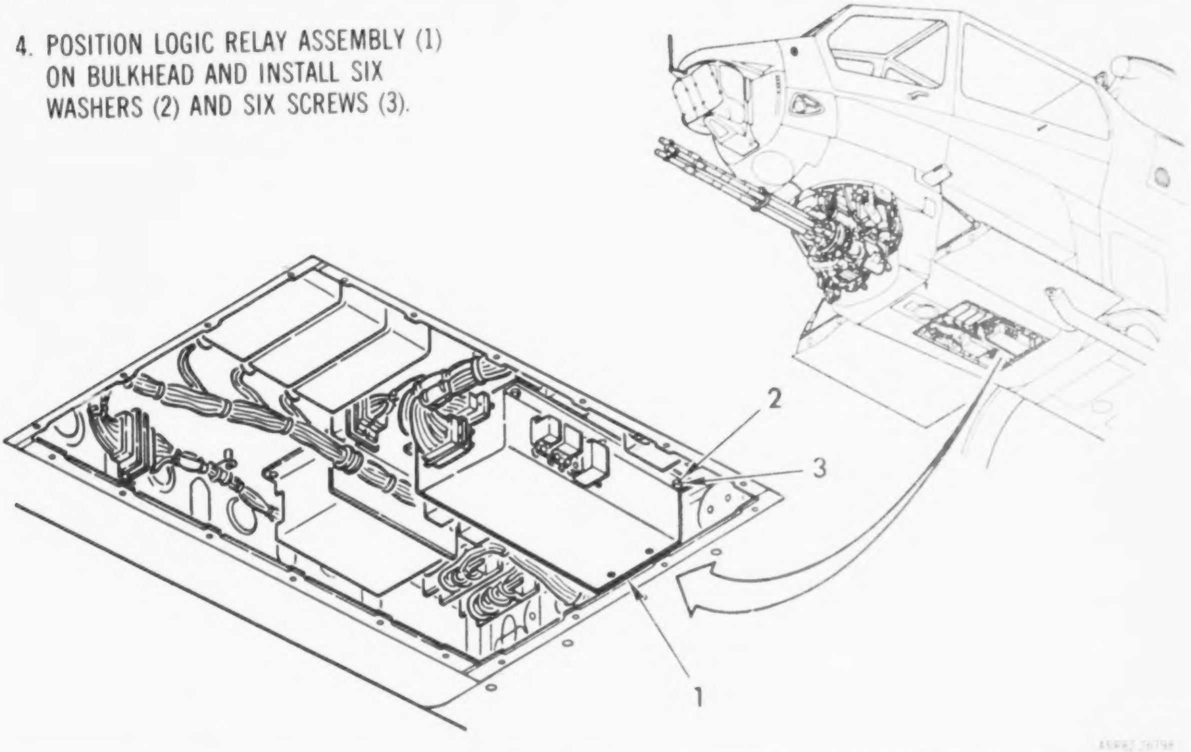
3. WHILE SUPPORTING LOGIC RELAY ASSEMBLY (1), CONNECT THE FOLLOWING CONNECTORS:

   22A5P1 (2)
   22A5P2 (3)



INSTALLATION (cont)

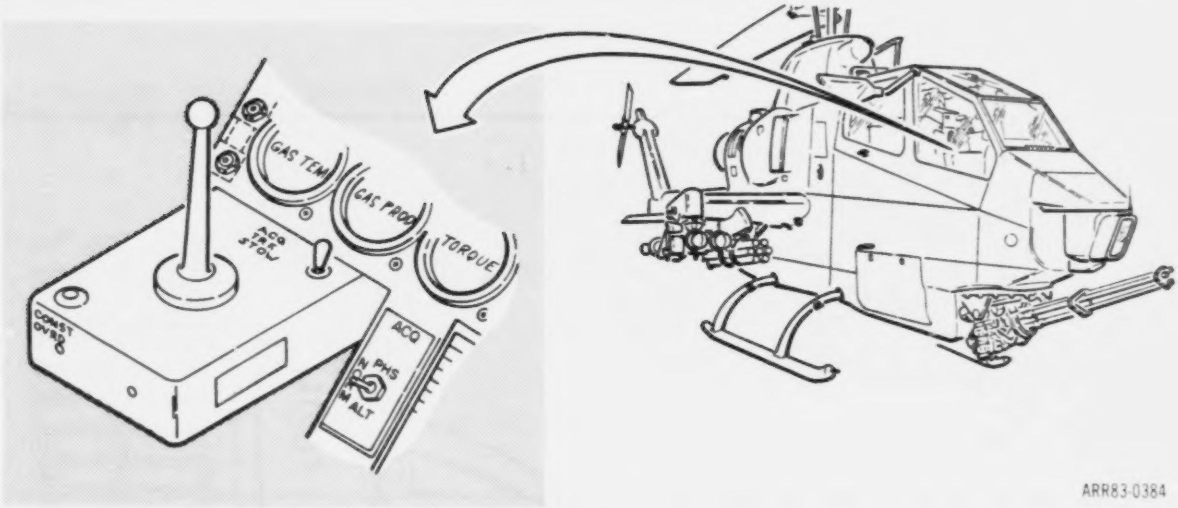
4. POSITION LOGIC RELAY ASSEMBLY (1) ON BULKHEAD AND INSTALL SIX WASHERS (2) AND SIX SCREWS (3).



END OF TASK

Section XXII. MAINTENANCE OF ACQUISITION SWITCH PANEL AND SWITCH

Section Contents	Para
Repair of Acquisition Switch Panel and Switch	3-73


GAS TEMP
GAS PROD
TORQUE
ACQ
TAK
STOW
CONST
OVRD
ACQ
PHS
ALT

ARR83-0384

3-73. REPAIR OF ACQUISITION SWITCH PANEL AND SWITCH

DESCRIPTION

This task covers: Removal, inspection, and installation.

INITIAL SETUP

Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental
  Multimeter, AN/USM-223

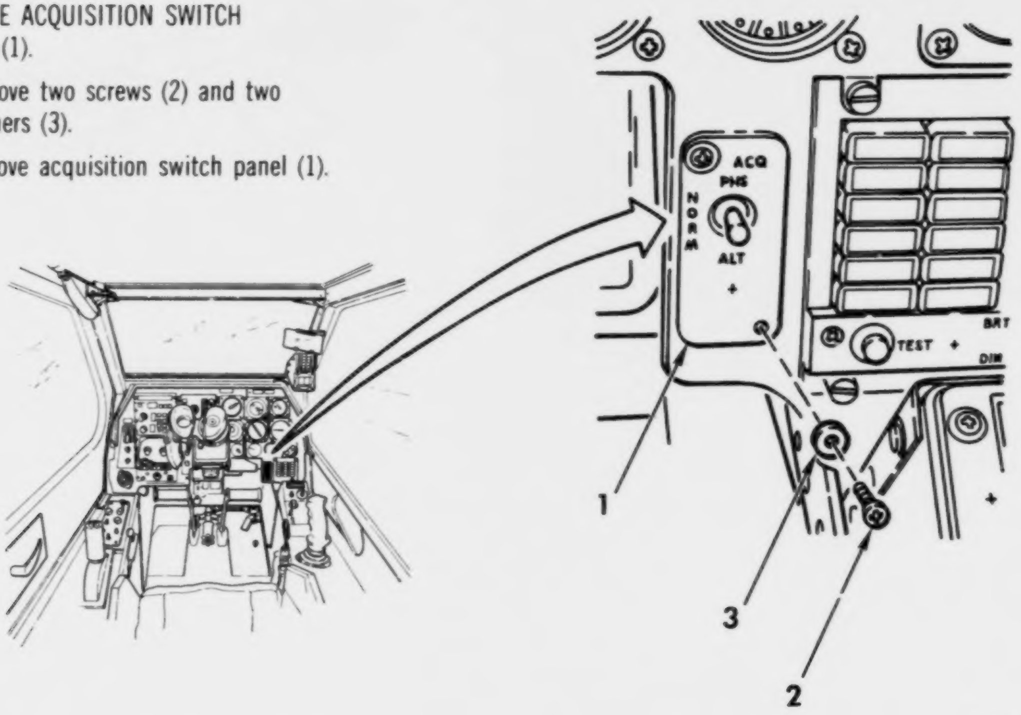
Materials:
  Paint (Item 11, Appx D)

Personnel Required:
  68J Aircraft Fire Control Repairer

Equipment Conditions:
  HELICOPTER ARMAMENT
    SUBSYSTEM MAINTENANCE
    SETUP performed, para 2-6.

---

1. REMOVE ACQUISITION SWITCH PANEL (1).
   a. Remove two screws (2) and two washers (3).
   b. Remove acquisition switch panel (1).

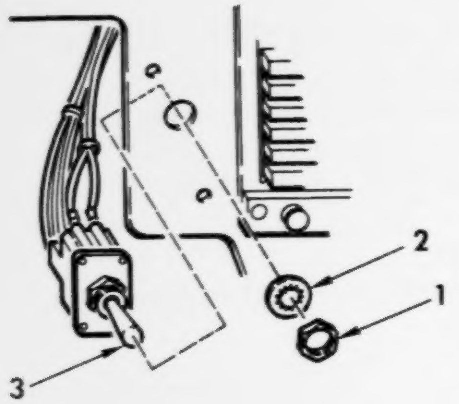


REMOVAL (cont)

2. REMOVE THE FOLLOWING:

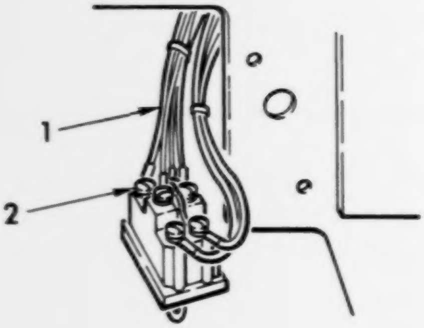
   NUT (1)
   LOCKWASHERS (2)

   PULL SWITCH (3) AWAY FROM INSTRUMENT PANEL.



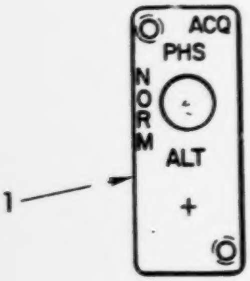
ARR82-26808

3. DISCONNECT WIRES (1) FROM SWITCH TERMINALS (2).



ARR82-26809

4. INSPECT ACQUISITION SWITCH PANEL (1).
   a. Inspect panel (1) for cracks and/or damage. Replace damaged panel.
   b. Inspect panel (1) for scratches. Touchup scratches with paint.



ARR82-26810

3-73. REPAIR OF ACQUISITION SWITCH PANEL AND SWITCH (cont)

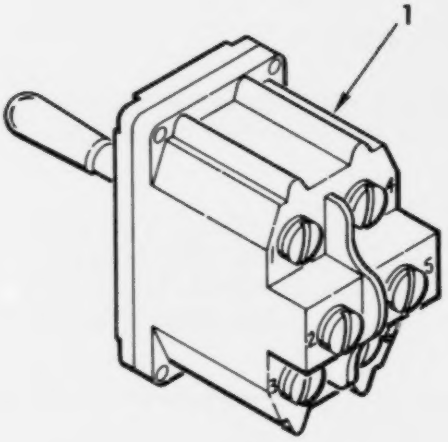
5. INSPECT ACQUISITION SWITCH.

   a. Inspect switch for cracks and/or damage. Replace damaged switch.

   b. Perform continuity check in accordance with the following table:

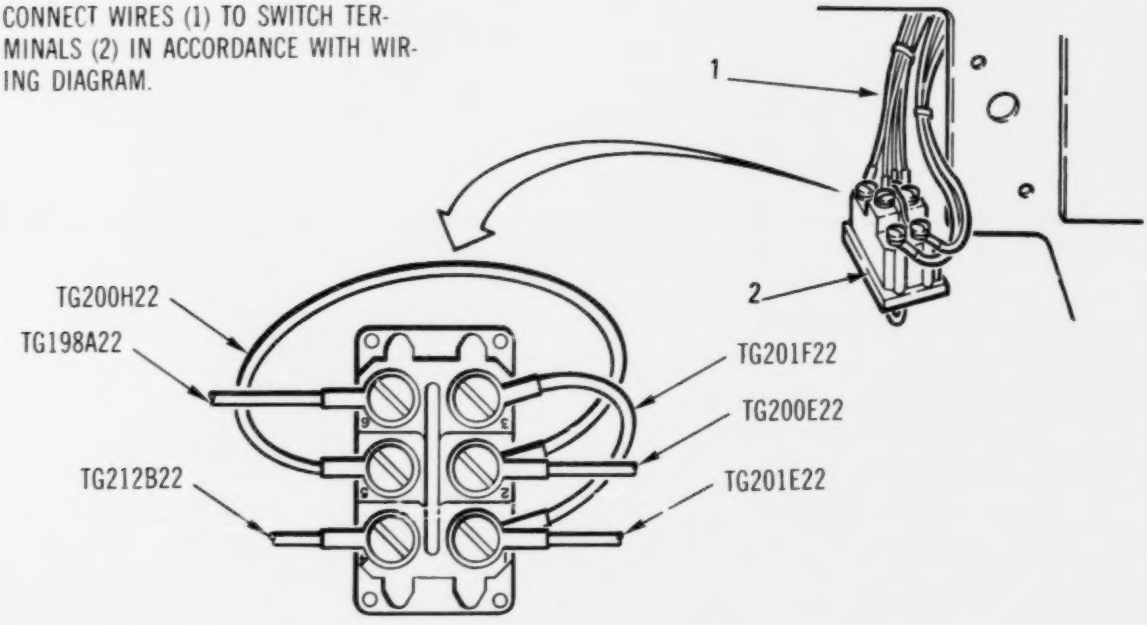
Switch Position	Terminal		Results
	From	To	
PHS	2	1 and 4	Continuity
ALT	2	1 and 6	Continuity
NORM	2	1,4 and 6	Open

   Replace switch (1) failing check.



ARR82-26811

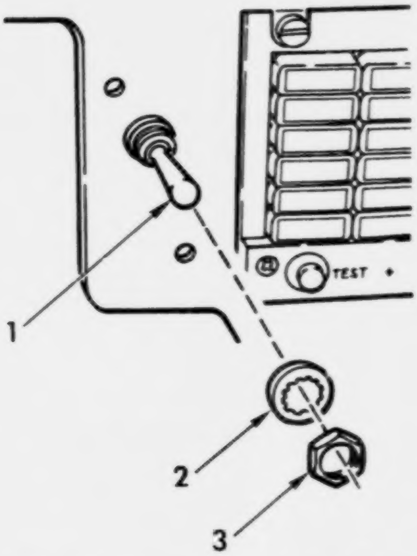
6. CONNECT WIRES (1) TO SWITCH TERMINALS (2) IN ACCORDANCE WITH WIRING DIAGRAM.


1
2
TG200H22
TG198A22
TG212B22
TG201F22
TG200E22
TG201E22
6
3
5
2

ARR82-27952

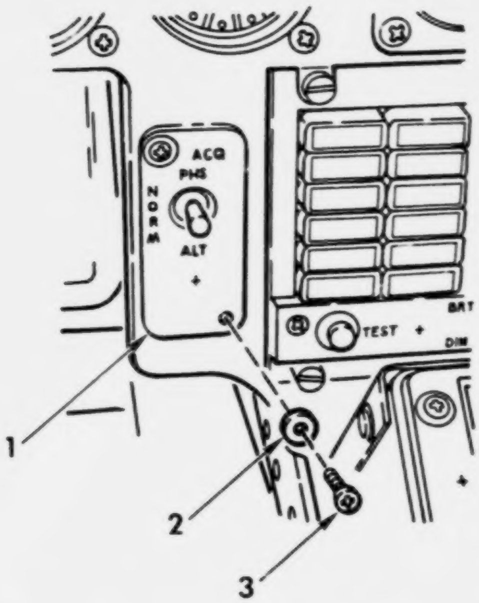
INSTALLATION (cont)

7. POSITION SWITCH (1) IN INSTRUMENT PANEL AND INSTALL LOCKWASHER (2) AND NUT (3).



ARR82-27953

8. INSTALL ACQUISITION SWITCH PANEL (1).
   a. Position acquisition switch panel (1) on instrument panel.
   b. Install two washers (2) and two screws (3).


ACQ
PHS
NORM
ALT
TEST
BRT
DIM
1
2
3

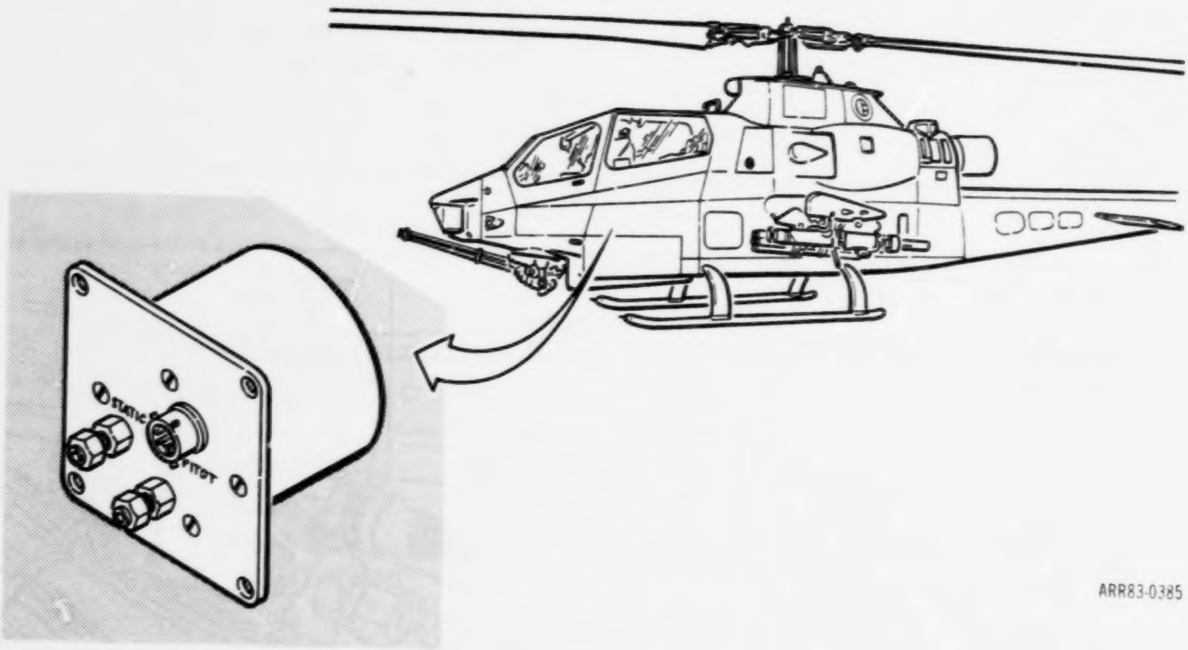
ARR82-27954

END OF TASK

Section XXIII. MAINTENANCE OF AIRSPEED TRANSDUCER

Section Contents

	Para
Removal/Installation of Airspeed Transducer	3-74


STATIC
PITOT
ARR83-0385

3-74. REMOVAL/INSTALLATION OF AIRSPEED TRANSDUCER

DESCRIPTION

This task covers: Removal and installation.

INITIAL SETUP

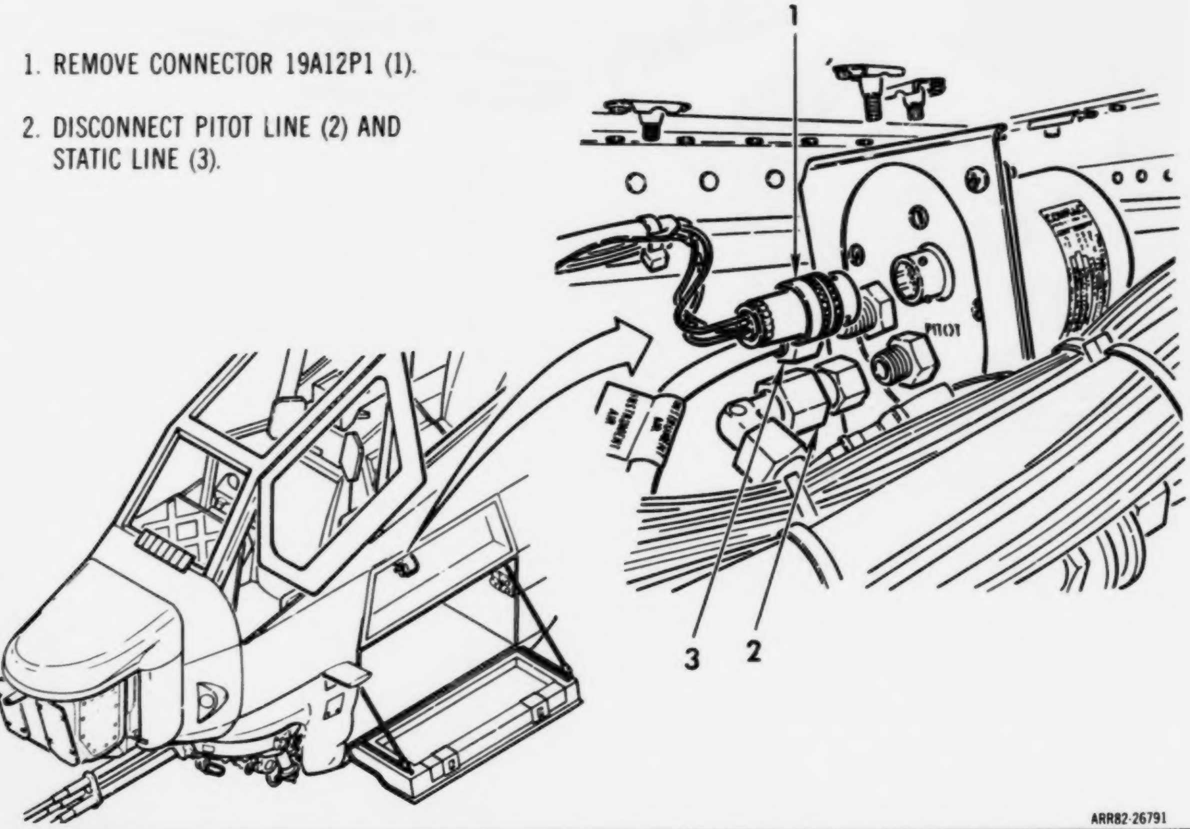
Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental

References:
  TM 55-1520-236-23

Personnel Required:
  68J Aircraft Fire Control
    Repairer

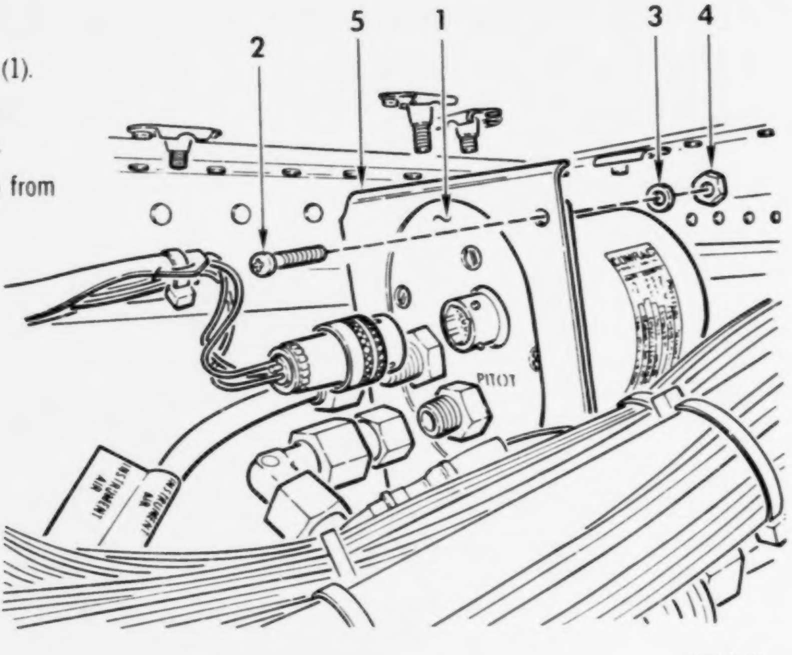
Equipment Conditions:
  HELICOPTER ARMAMENT SUBSYSTEM MAINTENANCE SET-UP performed, para 2-6.
  Left outer panel removed, see TM 55-1520-236-23.

1. REMOVE CONNECTOR 19A12P1 (1).
2. DISCONNECT PITOT LINE (2) AND STATIC LINE (3).



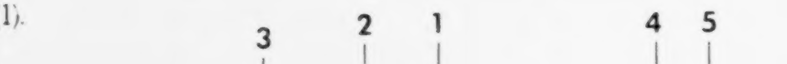
REMOVAL (cont)

3. REMOVE AIRSPEED TRANSDUCER (1).
   a. Remove three screws (2), three washers (3), and three nuts (4).
   b. Remove airspeed transducer (1) from bracket (5).


2
5
1
3
4
PITOT
INSTRUMENT AIR
INSTRUMENT AIR

ARR82-26792

4. INSTALL AIRSPEED TRANSDUCER (1).
   a. Position airspeed transducer (1) on bracket (2).
   b. Install three screws (3), three washers (4), and three nuts (5).

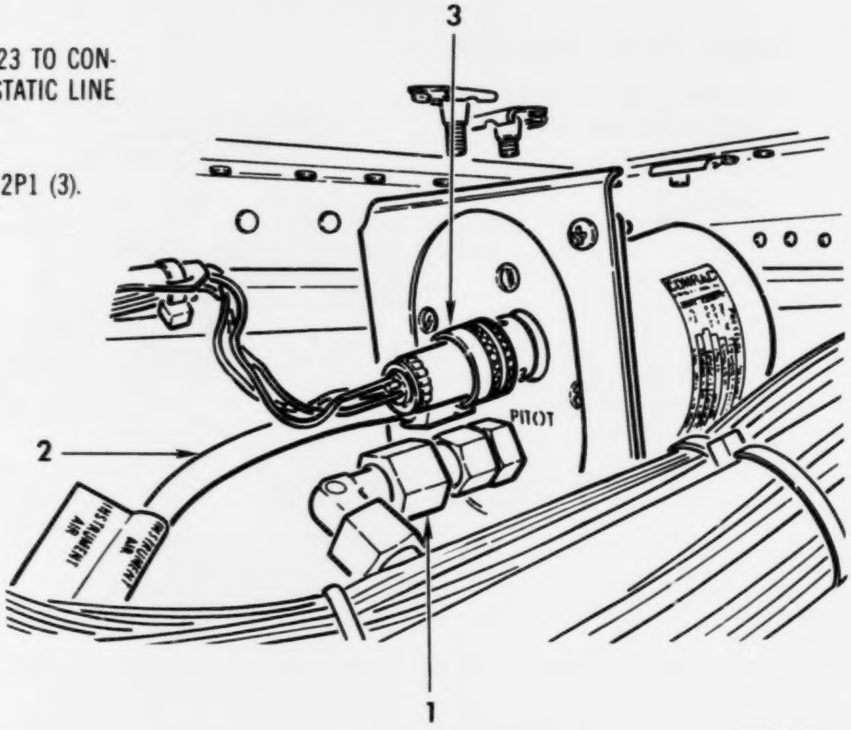


ARR82-26793

3-74. REMOVAL/INSTALLATION OF AIRSPEED TRANSDUCER (cont)

5. REFER TO TM 55-1520-236-23 TO CONNECT PITOT LINE (1) AND STATIC LINE (2).

6. CONNECT CONNECTOR 19A12P1 (3).


3
2
PITOT
INSTRUMENT AIR
INSTRUMENT AIR
1

ARR82-26794

END OF TASK

CHAPTER 4

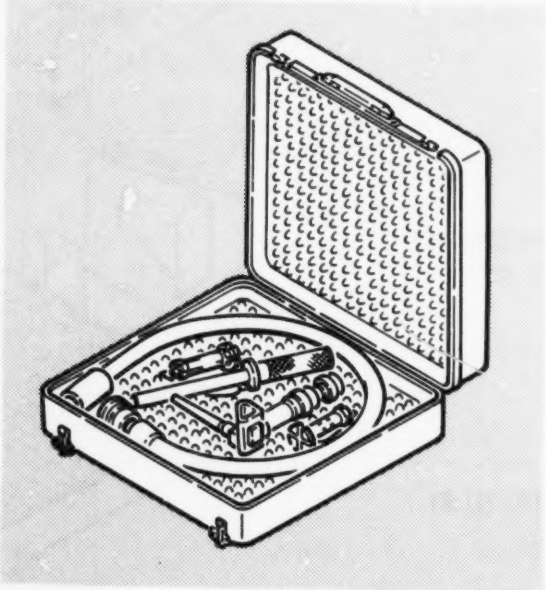
MAINTENANCE OF AUXILIARY EQUIPMENT

CHAPTER CONTENTS

		Page
Section I	Maintenance of Universal Boresight Kit	4-1
Section II	Maintenance of 20-mm Barrel Erosion Gage	4-3

Section I. MAINTENANCE OF UNIVERSAL BORESIGHT KIT

Section Contents	Para
Repair of Universal Boresight Kit	4-1



ARR83-0386

4-1. REPAIR OF UNIVERSAL BORESIGHT KIT

DESCRIPTION

This task covers: Disassembly, cleaning, inspection, and assembly.

INITIAL SETUP

Tools/Test and Support Equipment:
Tool Set, A/C Armament
Repairman: Basic
Tool Set, A/C Armament
Repairman: Supplemental

Personnel Required:
68M Aircraft Weapon Systems
Repairer

Equipment Conditions:
In shop, on bench.

DISASSEMBLY

1. REMOVE THREE STREAMERS (1) BY DISENGAGING "S" HOOKS (2).

CLEANING

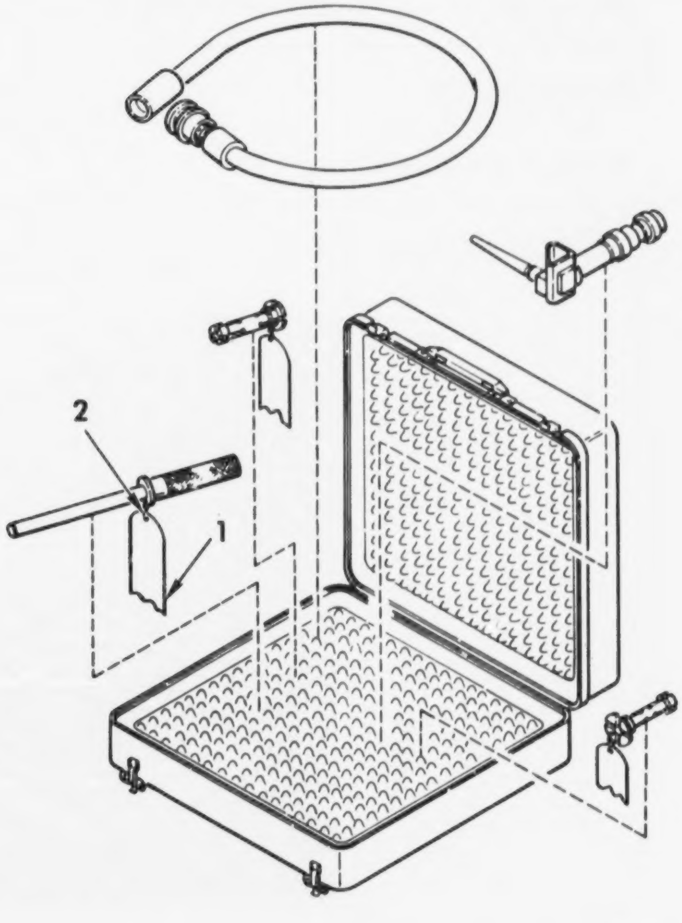
2. PERFORM GENERAL CLEANING PROCEDURES IN ACCORDANCE WITH CHAPTER 3, SECTION IV.

INSPECTION

3. PERFORM GENERAL INSPECTION PROCEDURES IN ACCORDANCE WITH CHAPTER 3, SECTION IV.

ASSEMBLY

4. INSTALL THREE STREAMERS (1) BY ENGAGING "S" HOOKS (2).



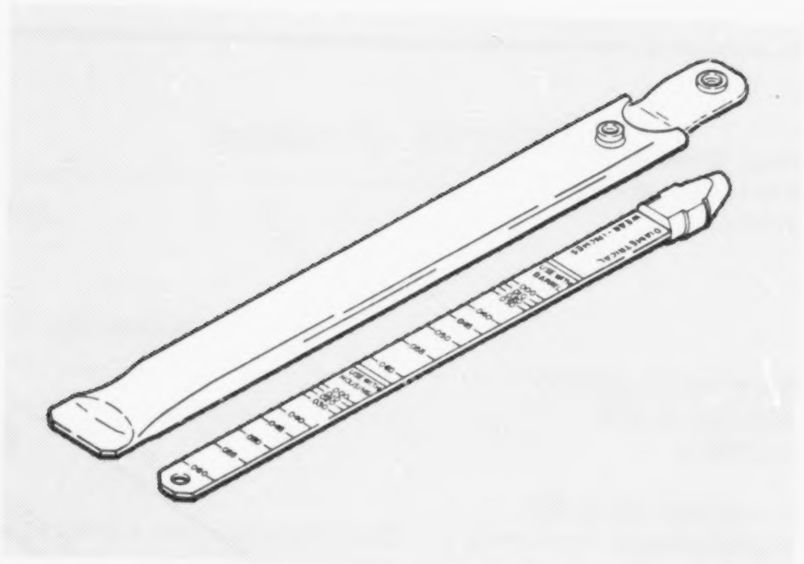
ARR82-27539

END OF TASK

Section II. MAINTENANCE OF 20-MM BARREL EROSION GAGE

Section Contents

	Para
Repair of 20-mm Barrel Erosion Gage	4-2



ARR83-0387

4-2. REPAIR OF 20-MM BARREL EROSION GAGE

DESCRIPTION

This task covers: Cleaning, inspection, and repair.

INITIAL SETUP

Tools/Test and Support Equipment:
Tool Set, A/C Armament
Repairman: Basic
Tool Set, A/C Armament
Repairman: Supplemental

Personnel Required:
68M Aircraft Weapon Systems
Repairer

Equipment Conditions:
In shop, on bench.

CLEANING

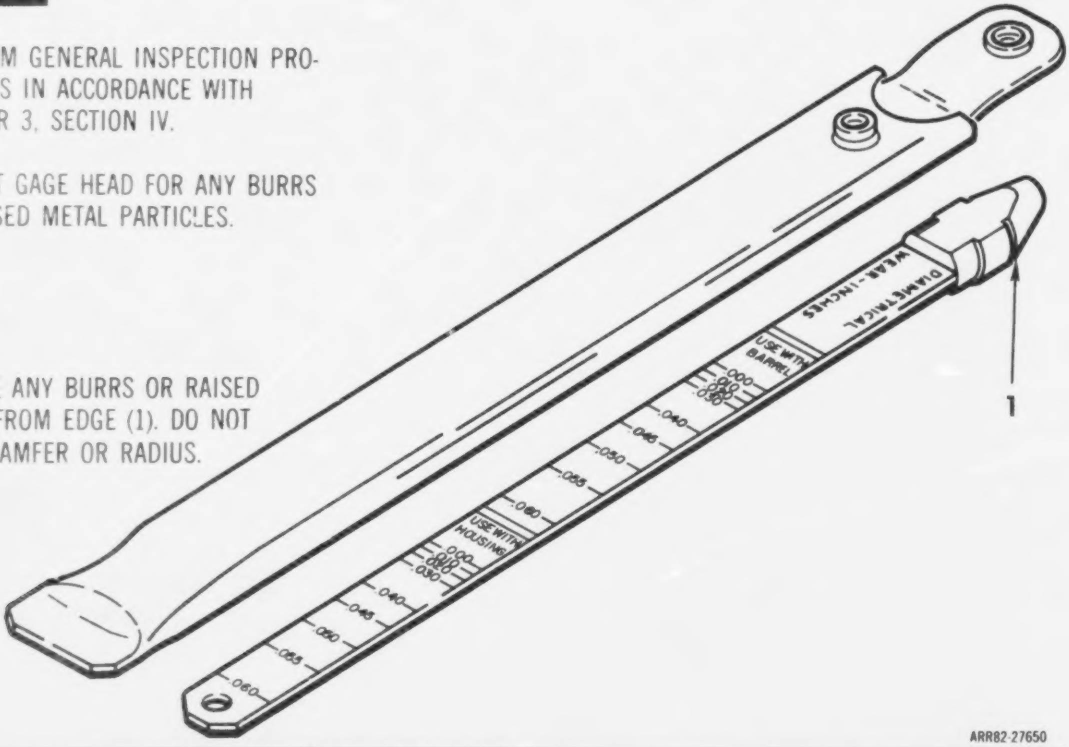
1. PERFORM GENERAL CLEANING PROCEDURES IN ACCORDANCE WITH CHAPTER 3, SECTION IV.

INSPECTION

2. PERFORM GENERAL INSPECTION PROCEDURES IN ACCORDANCE WITH CHAPTER 3, SECTION IV.
3. INSPECT GAGE HEAD FOR ANY BURRS OR RAISED METAL PARTICLES.

REPAIR

4. REMOVE ANY BURRS OR RAISED METAL FROM EDGE (1). DO NOT ADD CHAMFER OR RADIUS.


1
DIAMETRICAL WEAR-INCHES
USE WITH BARREL
.000
.010
.020
.030
.040
.045
.050
.055
.060
USE WITH HOUSING
.000
.010
.020
.030
.040
.045
.050
.055
.060

ARR82-27650

END OF TASK

CHAPTER 5

AMMUNITION

CHAPTER CONTENTS

		Page
Section I	General	5-1
Section II	Preparation for Firing	5-5
Section III	Care, Handling, and Preservation	5-5

Section I. GENERAL

Section Contents	Para
General	5-1
Description and Identification	5-2

GENERAL

5-1. This chapter contains a description of the 20-mm ammunition intended for use with the turret subsystem. National stock numbers and pertinent data for the standard ammunition are listed in SC-1305/30-IL.

WARNING

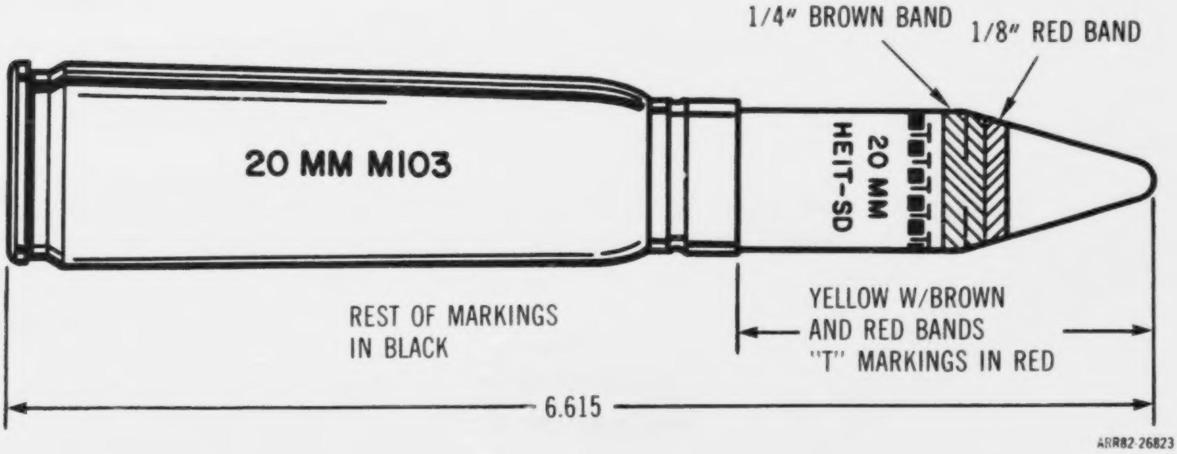
Rechambering of live ammunition is prohibited. The use of previously chambered cartridges may result in damage to equipment or injury to personnel due to cartridge hangfire. Propellant-primer contamination, a cause of hangfire, can occur because the chambering action may loosen the projectile in the cartridge case and break the waterproof seal. Any cartridges that have been chambered and later extracted unfired will be disposed of in accordance with TM 9-1300-206 and/or local regulations.

DESCRIPTION AND IDENTIFICATION

5-2. Ammunition is painted and color coded to provide a handy means of identification. Caliber, type, model, and lot number are marked on the projectiles. The various ammunition types and color codes are identified in the following tabulated data. The various types of ammunition are further described in the following paragraphs.

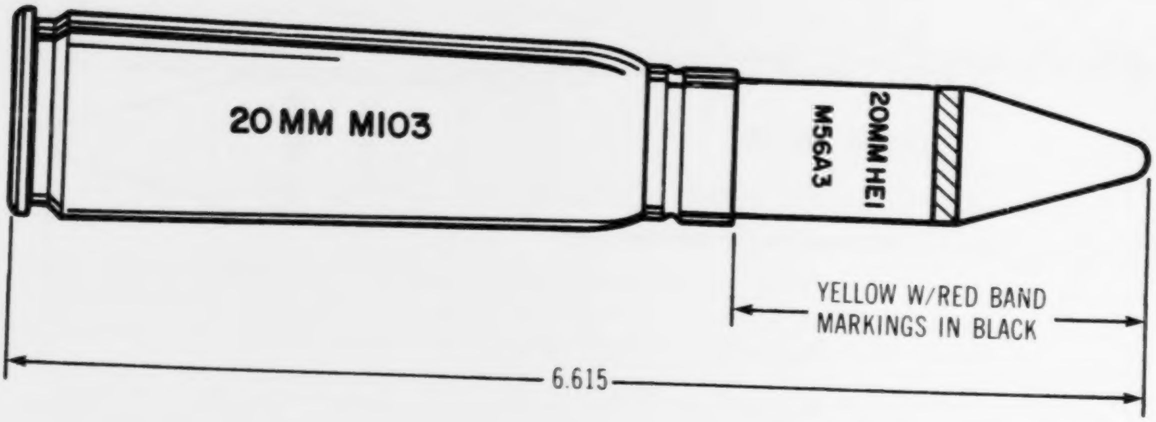
Type of Ammunition	Color of Projectile	Color of Marking
HEIT-SD M246 (high-explosive incendiary tracer-self-destruct)	Yellow w/brown and red bands	"T" in red, rest of markings black
HEI, M56A-3 (high-explosive incendiary)	Yellow w/red band	Black
TP-T, M220 (target practice-tracer)	Blue	"T" in orange, rest of markings in white
TP, M55A2 (target practice)	Blue	White
Dummy, M51A2	Chromate	Metal Stamping

M246 20-MM CARTRIDGE


1/4" BROWN BAND
1/8" RED BAND
20 MM M103
20 MM
HEIT-SD
REST OF MARKINGS IN BLACK
YELLOW W/BROWN AND RED BANDS "T" MARKINGS IN RED
6.615
ARR82-26823

The high-explosive incendiary with tracer self-destroying (HEIT-SD), M246 cartridge is assembled with an M505A3 point detonating (PD) fuze. The projectile, in addition to the M505A3 fuze, consists of an HEI charge, self-destruct relay charge, and a tracer charge. These charges form the self-destruct chain. The tracer burns for about 3 to 7 seconds, whereupon the relay charge is ignited which detonates the HEI charge low order. If impact with a target occurs, prior to self-destruction, the M505A3 fuze causes the HEI charge to detonate high order. This cartridge is for use against aerial targets.

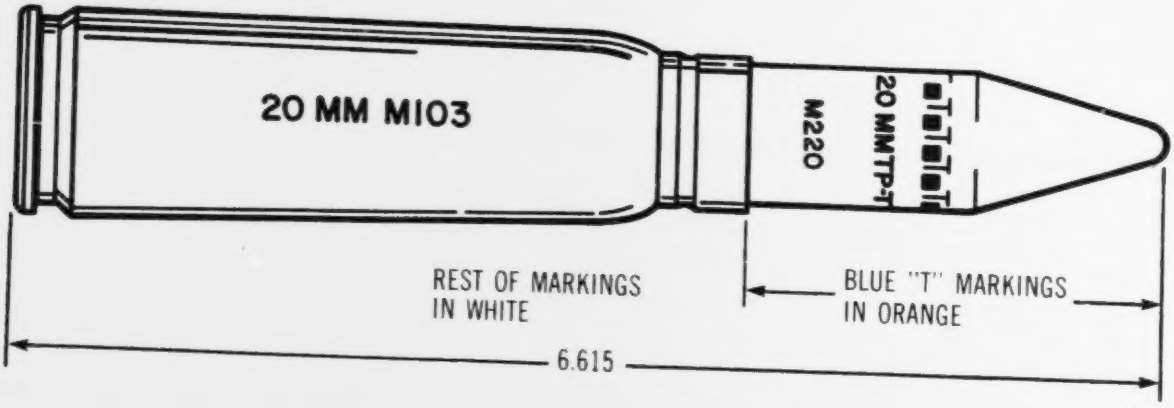
M56A3 20-MM CARTRIDGE


20 MM M103
20MM HEI
M56A3
YELLOW W/RED BAND
MARKINGS IN BLACK
6.615

ARR82 26824

The high-explosive incendiary (HEI), M56A3 cartridge is for use against ground targets, including lightly armored vehicles, functioning with both explosive and incendiary effect. The projectile consists of an HEI charge and is assembled with the M505A3 fuze. The M505A3 fuze is a point-detonating, single-action fuze intended to function on impact with the target.

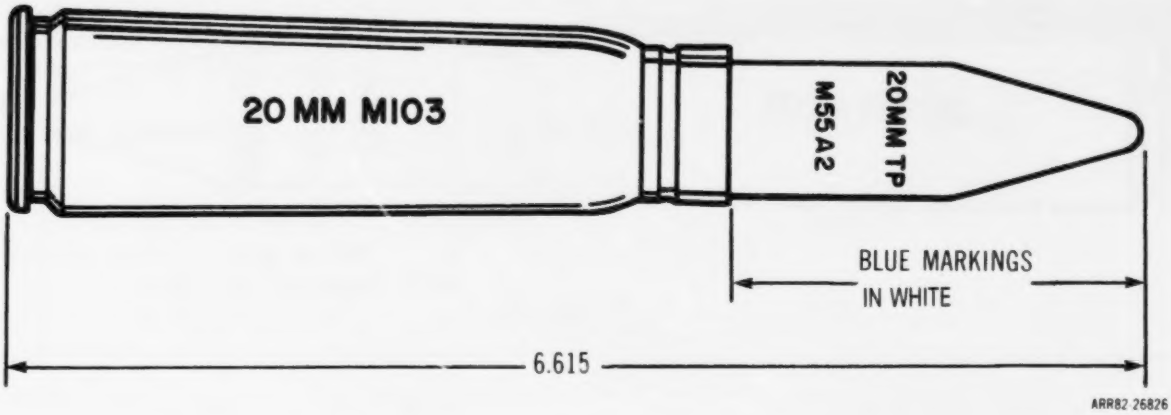
M220 20-MM CARTRIDGE


20 MM M103
20 MM TP-T
M220
REST OF MARKINGS
IN WHITE
BLUE "T" MARKINGS
IN ORANGE
6.615

ARR82 26825

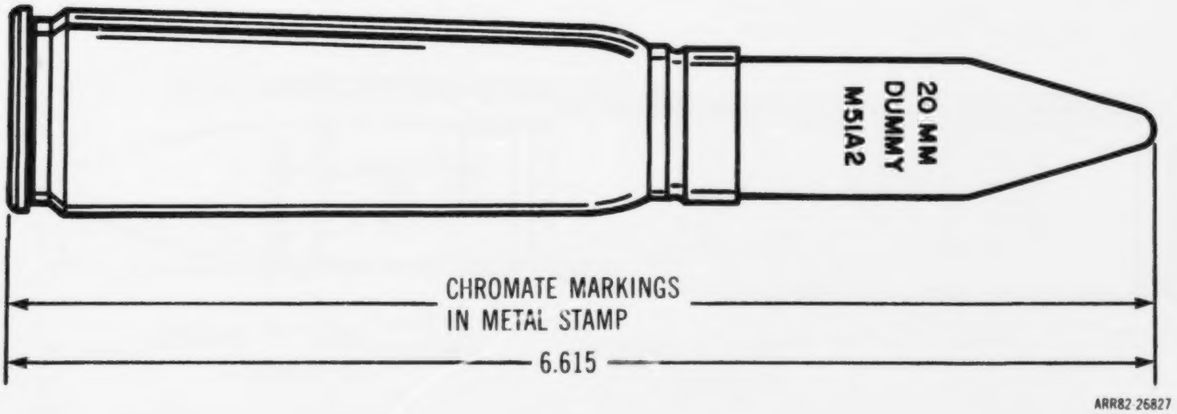
The target practice-tracer (TP-T), M220 cartridge is for practice and training. The projectile is similar to the M56A3 projectile, but has no HEI charge and is assembled with a dummy fuze. The projectile does contain a tracer composition which burns visibly for a minimum of 1.9 seconds.

M55A2 20-MM CARTRIDGE


20 MM M103
20MM TP
M55A2
BLUE MARKINGS IN WHITE
6.615
ARR82 26826

The target practice (TP), M55A2 cartridge is for practice and test firings. The projectile is similar to the M56A3 projectile, but is hollow and contains no HEI charge tracer.

M51A2 20-MM CARTRIDGE


20 MM
DUMMY
M51A2
CHROMATE MARKINGS IN METAL STAMP
6.615
ARR82 26827

The dummy, M51A2 cartridge is a completely inert assembly used for filling the conveyor system during shipment or storage and for nonfiring system checkout.

Section II. PREPARATION FOR FIRING

Ammunition will be visually inspected to assure that it is clean, free of grease and corrosion, and that it is free of perforations, cracks and splits, severe scratches, cuts and dents other than those caused by normal delinking and relinking operations.

Section III. CARE, HANDLING, AND PRESERVATION

Explosive ammunition must be handled with appropriate care at all times. Explosive elements such as primers and fuzes are sensitive to excessive shock, electrical discharge, and temperature. Keep ammunition in a serviceable condition and ready for immediate use as follows:

1. Store ammunition in original containers in a dry, well-ventilated place protected from rays of sun and other sources of excessive heat.
2. Keep ammunition and its container clean and dry and protected from possible damage.
3. Disassembly of components of ammunition, such as fuzes and primers, is strictly prohibited. Any alteration of ammunition is hazardous and shall not be undertaken. Relinking of ammunition is permitted.
4. Do not open sealed ammunition containers or remove protective or safety devices until just before use.
5. Return ammunition, prepared for firing but not fired, to its original packing and mark it appropriately. Use such ammunition first in subsequent firings in order to keep stocks of opened packages at a minimum.

APPENDIX A

REFERENCES

PURPOSE

A-1. This appendix lists publications which apply to maintaining the Armament Subsystem, Helicopter; 20-mm Automatic Gun: M97A4.

ARRANGEMENT

A-2. The publications are arranged by type and then in alphanumeric order by publication number.

ARMY REGULATIONS

AR 70-50	Military Aircraft, Rockets, and Guided Missiles
AR 95-1	Army Aviation General Provisions and Flight Regulations
AR 385-40	Accident Reporting and Records

DA PAMPHLET

DA PAM 738-751	Functional Users Manual for the Army Maintenance Management System - Aviation (TAMMS-A)

FIELD MANUALS

FM 10-68	Aircraft Refueling
FM 17-40	Helicopter Gunnery
FM 21-11	First Aid for Soldiers

FORMS

DA FORM 2028	**Recommended Changes to Publications and Blank Forms**
DA FORM 2404	Equipment Inspection and Maintenance Worksheet
DA FORM 2408-4	Weapon Record Data
SF 368	Quality Deficiency Report

MILITARY SPECIFICATION

MIL-P-116	Method of Preservation

MISCELLANEOUS PUBLICATIONS

CTA 50-970	Expendable/Durable Items Except Medical, Classified, Repair Parts, and Heraldic Items

SUPPLY CATALOGS

SC 1305/30-IL	FSC 1305 - 1 Ammunition, Thru 30-MM; FSC 1310 - Ammunition, Over 30-MM Up to 75-MM; FSC 1315 - Ammunition, 75-MM Thru 125-MM; FSC 1320 - Ammunition, Over 125-MM; FSC 1325 - Bombs; and FSC 1330 - Grenades
SC 5180-95-CL-B09	Tool Set, Aircraft Armament Repairman, Basic
SC 5180-95-CL-B10	Tool Kit, Aircraft Armament Repairman, Supplemental

TECHNICAL BULLETIN

TB MED 251	Noise and Conservation of Hearing

TECHNICAL MANUALS

TM 9-1055-460-13&P	Operator, Aviation Unit and Intermediate Maintenance Manual (Including Repair Parts and Special Tools) for 2.75-Inch Rocket Launchers
TM 9-1090-206-20-2	Aviation Unit Maintenance Manual for Armament Subsystem, Helicopter; 20-mm Automatic Gun: M97A3
TM 9-1090-206-23P	Aviation Unit Maintenance and Intermediate Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools List)
TM 9-1090-206-30	Aviation Intermediate Maintenance Manual for Armament Subsystem, Helicopter; 20-mm Automatic Gun: M97A4, M97A3
TM 9-1090-207-13&P	Aviation Unit and Intermediate Maintenance Manual With Repair Parts and Special Tools List (RPSTL) (Including Depot Maintenance Repair Parts and Special Tools) for M147 Rocket Management Subsystem
TM 9-1270-212-14&P	Aviation Unit and Aviation Intermediate Maintenance Manual With Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts) for M128 and M136 Helmet-Directed Fire Control Subsystem
TM 9-1270-218-13&P	Operator's, Aviation Unit, and Aviation Intermediate Maintenance Manual With Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts) for M26 Digital Fire Control Computer

TM 9-1270-219-13&P	Operator, Aviation Unit, and Intermediate Instructions With Repair Parts and Special Tools Lists (RPSTL) (Including Depot Maintenance Repair Parts and Special Tool List) for M143 Helicopter Armament Fire and Flight Air Data Subsystem
TM 9-1270-220-13&P	Operator, Aviation Unit, and Aviation Intermediate Maintenance Manual With Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts) for M76 Head-Up Subsystem Helicopter
TM 9-1300-206	Care, Handling, Preservation and Destruction of Ammunition
TM 9-1425-473-20	Organizational Maintenance Instructions Armament Subsystem, Helicopter, TOW Guided Missile M65
TM 9-1425-473-34	Direct and General Support Maintenance Instructions Armament Subsystem, Helicopter, TOW Guided Missile M65
TM 9-214	Inspection, Care, and Maintenance of Antifriction Bearings
TM 9-4931-583-30&P	Aviation Intermediate Maintenance Instructions (Including Repair Parts and Special Tools List) for Boresight Kit
TM 9-4933-224-13&P	Operators, Aviation Unit and Intermediate Maintenance Instructions With Repair Parts and Special Tools List (RPSTL) (Including Depot Maintenance Repair Parts and Special Tools) for Electronics Systems Test Set: M137
TM 55-1500-204-25/1	General Aircraft Maintenance Manual
TM 55-1520-236-10	Operators Instructions — AH-1S Helicopter
TM 55-1520-236-CL	Operators and Crewmembers Checklist — AH-1S Helicopter
TM 55-1520-236-T	Troubleshooting Instructions, Aviation Unit Maintenance (AVUM) Level and Intermediate Maintenance (AVIM) Level for AH-1S (MC) Integrated Armament and Fire Control System
TM 55-1520-236-23	Aviation Unit and Intermediate Maintenance Instructions, AH-1S Helicopter
TM 55-1520-239-10	Operators Instructions — AH-1G/S (MC) Helicopter
TM 55-1520-239-CL	Operators and Crewmembers Checklist — AH-1G/S (MC) Helicopter
TM 55-1520-239-23	Aviation Unit and Intermediate Maintenance Instructions, AH-1G/S (MC) Helicopter
TM 740-90-1	Administrative Storage of Equipment
TM 750-244-1-5	Procedures for the Destruction of Aircraft and Associated Equipment to Prevent Enemy Use

APPENDIX B

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

GENERAL

B-1. This section provides an explanation of all maintenance and repair functions authorized at various maintenance levels.

a. The Maintenance Allocation Chart (MAC) in Section II designates overall responsibility for the performance of maintenance functions on the identified end item or component. The implementation of the maintenance functions upon the end item or component will be consistent with the assigned maintenance functions.

b. Section III lists the special tools and test equipment required for each maintenance function as referenced from Section II.

c. Section IV contains supplemental instructions and explanatory notes for a particular maintenance function.

MAINTENANCE FUNCTIONS

B-2. Maintenance functions will be limited to and defined as follows:

a. Inspect. To determine serviceability of an item by comparing its physical, mechanical and electrical characteristics with established standards.

b. Test. To verify serviceability by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. To clean, to preserve, to charge, and to add fuel, lubricants, cooling agents and air.

d. Adjust. To maintain mechanical or electrical characteristics to their proper operating range.

e. Aline to adjust specified variable elements of an item to bring to optimum performance.

f. Calibrate. To determine the corrections to be made in the readings of instruments or test equipment used in precise measurement. Consists of the comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument or test equipment being compared with the certified standard.

g. Remove/Install. To remove and install the same item to perform required service or maintenance functions. Install may be emplacing, seating, or positioning a spare, repair part, subassembly, or assembly to allow proper functioning of an equipment or system.

h. Replace. To replace unserviceable items with serviceable assemblies, subassemblies or parts.

i. Repair. To restore an item to serviceable condition through correction of a specific failure or unserviceable condition. This includes, but is not limited to, inspection, cleaning, preserving, adjusting, replacing, welding, riveting, and strengthening.

j. Overhaul. To restore an item to a completely serviceable condition as prescribed by maintenance serviceability standards prepared and published for the specific item to be overhauled.

k. Rebuild. To restore an item to a standard as nearly as possible to the original or new condition in appearance, performance, and life expectancy. This is accomplished through the maintenance technique of complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or unserviceable elements (items) using original manufacturing tolerances and specifications, and subsequent reassembly of the item.

EXPLANATION OF COLUMNS IN THE MAC, SECTION II

B-3. The entries required in the MAC are explained below.

a. Column 1, Group Number. Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies, and modules with the next higher assembly.

b. Column 2, Component Assembly. Column 2 contains the names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column 3, Maintenance Functions. Column 3 lists the functions to be performed on the item listed in column 2 (for detailed explanation of these functions, see para B-2).

d. Column 4, Maintenance Level. Column 4 specifies, by the listing of a "work time" figure in the appropriate subcolumn(s), the lowest level of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform the maintenance function at the indicated level of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance levels, appropriate "work time" figures will be shown for each level. The number of manhours specified by the "work time" figure represents the average time required to restore an item (assembly, subassembly, component module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time, troubleshooting time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. The symbol designations for the various maintenance levels are as follows:

O — AVUM
F — AVIM
D — Depot

e. Column 5, Tools and Equipment. Column 5 specifies, by code, those common tool sets (not individual tools) and special tools, TMDE, and support equipment required to perform the designated function.

f. Column 6, Remarks. This column shall, when applicable, contain a letter code in alphabetic order which shall be keyed to the remarks contained in Section IV.

EXPLANATION OF COLUMNS IN TOOL AND TEST EQUIPMENT REQUIREMENTS SECTION III

B-4. An explanation of the columns in Section III is provided below.

a. Column 1, Reference Code. The tool and TMDE reference code correlates with a code used in the MAC Section II, Column 5.

b. Column 2, Maintenance Level. The lowest level of maintenance authorized to use the tool or test equipment.

c. Column 3, Nomenclature. Name or identification of the tool or test equipment.

d. Column 4, National Stock Number. The National Stock Number of the tool or TMDE.

e. Column 5, Tool Part Number. The manufacturer's part number.

EXPLANATION OF COLUMNS IN REMARKS SECTION IV

B-5. An explanation of the columns in Section IV is provided below.

a. Reference Code. The code recorded in column 6, Section II.

b. Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC, Section II.

Section II. MAINTENANCE ALLOCATION CHART

(1) Group Number	(2) Component/Assembly	(3) Maint. Function	(4) Maint. Category			(5) Tool/ Equipment	(6) Remarks
			AVUM	AVIM	DEPOT		
00	20-mm Automatic Gun Helicopter Armament Subsystems M97A3 9324699 L55 M97A4 9324960 L56	Inspect	1.2			33,31	
		Test	1.2			33	
		Service	1.3			33	
		Aline	0.3	4.5		7,8,31,33	B
		Remove/ Install		8.0		14,18,30,31,32	
		Replace		8.0		14,31	
		Repair	2.0	5.2		32,33	
		Overhaul			267.4		

(1) Group Number	(2) Component/Assembly	(3) Maint. Function	(4) Maint. Category			(5) Tool/ Equipment	(6) Remarks
			AVUM	AVIM	DEPOT		
01	Rocket Management Subsystem L55, L56 M147 12011877	Inspect	0.1				E
		Test	0.1	1.8			
		Remove/ Install	1.0				
		Replace	1.3				
		Repair	0.5	1.7			
		Overhaul			80.0		
02	Helmet-Directed Subsystem M136 2277716-00 L55, L56	Inspect	0.2				F
		Test	0.2	4.0			
		Service	0.5				
		Adjust	0.5	0.6			
		Aline	0.5	4.8			B
		Remove/ Install	0.8	1.5			
		Replace	0.8				
		Repair	0.5	5.8			
		Overhaul			79.0		
03	Head Up Display Subsystem Signal Processor L56	Inspect	0.5		1.4		G
		Test	0.8	1.8	1.0		
		Adjust		0.5	2.2		
		Aline		1.0			B
		Remove/ Install	1.0	1.5			
		Replace	2.0				
		Repair		3.1			
		Overhaul			77.0		
03	Pilot Reflex Sight M73 209-071-298-1 L55	Inspect	0.5				
		Test	0.3				
		Service	0.8				
		Adjust	0.3				
		Aline	0.8	1.7			B
		Remove/ Install	2.0				
		Replace	3.7			1,31,32, 34,35	
		Repair	0.5	2.8			
		Overhaul			20.7		
03A1	Instrument Light 10553412	Inspect	0.3				D
		Replace	0.5			31	
0301	Armament Subsystem Mount 209-071-297-1	Inspect	0.1	0.5			D
		Service	0.1	0.5			
		Remove/ Install	0.3	0.8		31	
		Replace	0.8			31	
		Repair	0.2	0.3	4.0	31	

(1) Group Number	(2) Component/Assembly	(3) Maint. Function	(4) Maint. Category			(5) Tool/ Equipment	(6) Remarks
			AVUM	AVIM	DEPOT		
0301A1	Special Purpose Branched Cable Assembly 209-075-066-9	Inspect	0.1	0.2			
		Remove/ Install		0.5		31,33	
		Replace		0.8		22,31	
		Repair		0.5			
0302	Reflex Sight & Associated Components	Inspect	0.2				
		Service	0.5				
		Remove/ Install	0.8	1.0		28,31,32	
		Replace	0.1			28,31,32	
		Repair			3.5	28,31,32	
030201	Reflex Sight M73 10553252-1	Inspect	0.1	0.2			
		Service	0.1	0.1			
		Adjust			3.0	28,31,32	
		Remove/ Install	0.5	0.8		28,31,32	
		Replace		0.7		28,31,32	
		Repair			2.0	22,28,31,32	
		Overhaul			2.0	22,31,32	
03020101	Head Assembly 10553265	Inspect	0.1	0.5			
		Remove/ Install	0.5	0.5		31,32	
		Replace		0.6		31,32	
		Repair		0.5	2.5	31,32	
0302010101	Housing Assembly 10553272	Inspect		0.5			
		Remove/ Install		0.5	1.5	28,31,32	
		Replace		0.8		28,31,32	
		Repair	0.1	0.8	2.7	28,31,32	
0302010101A	Special Cable Assembly 10553274	Inspect	0.1	0.2		22	
		Remove/ Install		0.8		31,32	
		Replace		0.8		31,32	
		Repair		1.0	0.2	22,31,32	
03020102	Body Assembly 10553258-1	Inspect	0.1	0.2			
		Remove/ Install	0.1	0.2	0.3	28,31,32	
		Replace		0.1		28,31,32	
		Repair	0.2	0.5	1.7	28,31,32	
03020102A1	Baffle Assembly 10553304	Inspect			0.5		
		Remove/ Install			0.8	28,31,32	
		Replace			0.8	28,31,32	
		Repair			2.5	28,31,32	

(1) Group Number	(2) Component/Assembly	(3) Maint. Function	(4) Maint. Category AVUM	AVIM	DEPOT	(5) Tool/ Equipment	(6) Remarks
0302010201	Lamp Housing Assembly 10553254	Inspect	0.2				
		Test	0.1			22	
		Remove/ Install	0.5	0.5		31,32	
		Replace	0.5			31,32	
		Repair		0.5		31,32	
030202	Ranging Device 10553423	Inspect	0.1				
		Remove/ Install	0.3	0.3	0.3	1,31,32	
		Replace		0.3		1,31,32	
		Repair		0.5	0.5	1,31,32	
04	Digital Fire Control Computer M26 8680050-509 L56	Inspect	0.4	0.6			H
		Test	0.1	2.0			
		Adjust		0.5			
		Remove/ Install	0.5	1.2			
		Replace	0.4				
		Repair		0.4			
		Overhaul			47.9		
05	Air Data Subsystem M43 03-004-02 156	Inspect	0.1				N
		Test	0.1				
		Service	0.5				
		Remove/ Install	1.2				
		Adjust		1.7			
		Aline		1.5			B
		Replace	1.2				
		Repair		2.5		31,32	
		Overhaul			73.4		
06	Automatic Gun Declutching Feeder Assembly M89E1 12007300	Inspect	0.5			13	
		Test	0.5			13	C
		Service	0.5				
		Remove/ Install	0.8			31	
		Replace	0.8			31,32	
		Repair	2.0	0.5		31,32	
		Overhaul			8.0	31,32	
06A1	Clutch Lock Assembly 11838556	Inspect	0.1				
		Remove/ Install	0.5			31	
		Replace	0.5			31	
		Repair	0.7		1.7	31	
06A2	Housing Feeder Forward 12007302	Inspect	0.1				
		Remove/ Install	0.5				
		Replace	0.5				
		Repair	0.2		1.5	31,32	

(1) Group Number	(2) Component/Assembly	(3) Maint. Function	(4) Maint. Category			(5) Tool/ Equipment	(6) Remarks
			AVUM	AVIM	DEPOT		
06A3	T-Bar Guide Assembly 11838569	Inspect	0.1				
		Remove/ Install	0.2			31,32	
		Replace	0.2			31,32	
		Repair		0.5		31,32	
06A4	Aft Feeder Housing 12007301	Inspect	0.1				
		Remove/ Install	0.5			31,32	
		Replace	0.5			31,32	
		Repair	0.2		1.5	31,32	
07	Electrical Mechanical Rotary Actuator (Gun Drive Assembly) 189F734	Inspect	0.1				
		Test	0.8				C
		Remove/ Install	1.2			31	
		Replace	1.2			31	
		Repair	0.9	1.9		31,32	
		Overhaul			12.6	31,32	
07A1	Gun Drive Housing 189F727	Inspect	0.1				
		Remove/ Install		0.1		31	
		Replace		0.1		31	
		Repair		0.5		31	
0701	Direct Current Motor 5911320-1 (309GE6) 5911320-2 (G297CN711)	Inspect	0.1	0.1			C,J,P
		Remove/ Install		0.5		31	
		Replace		0.5		31	
		Repair		0.5	7.9	31,32	O
0701A1	Electrical Yoke 21474	Inspect			0.9		
		Test			1.0	21,23	
		Remove/ Install			0.5	31,32	
		Replace			0.5	31,32	
		Repair			0.8	21,31,32	
08	20-mm Three Barrel High Rate Gun, M197 11838579	Inspect	1.5			15,17	
		Test	2.7			20,26	C
		Service	0.5			9,10,31	
		Aline	0.7	1.2		7,8,33	B
		Remove/ Install	0.5			30,31	M
		Replace	0.5			30,31	M
		Repair	2.9			31	
		Overhaul			17.8	31	
08A1	Bearing Retainer Assembly 11838587	Inspect	0.1				D
		Remove/ Install	0.1			31,32	
		Replace	0.1			31,32	
		Repair		0.5			

(1) Group Number	(2) Component/Assembly	(3) Maint. Function	(4) Maint. Category			(5) Tool/ Equipment	(6) Remarks
			AVUM	AVIM	DEPOT		
08A2	Indexing Pin Assembly 7790768	Inspect	0.1				
		Remove/ Install	0.4			31	
		Replace	0.4			31	
		Repair	0.3			31	
0801	Mid-Barrel Clamp 11838584	Inspect	0.1			31	D
		Remove/ Install	0.3			31	
		Replace	0.3			31	
0802	Breech Bolt 11691422 11010157	Inspect	0.1			22	P
		Service	0.5			31	
		Remove/ Install	0.2			22,31	
		Replace	0.2			31	
		Repair	0.5			31	
0803	Firing Contact Assembly 11010186	Inspect	0.1			22	
		Remove/ Install	0.2			31	
		Replace	0.2			31	
		Repair	0.5			31	
0804	Matched Housing Subassembly 11691402	Inspect	0.2				
		Remove/ Install	0.1			31,32	
		Replace	0.1			31,32	
		Repair	0.7		4.5	31,32	
0805	Rotor Assembly 11838574	Inspect	0.1				
		Remove/ Install	0.2			31	
		Replace		0.3		6,31	
		Repair	0.2	0.2	5.7	6,31,32	
0805A1	Annular Ball Bearing 12000373	Inspect	0.1				D
		Service	0.3	0.5			
		Remove/ Install		0.2		31	
		Replace		0.2		31	
0805A2	Rotor Subassembly 11838589	Inspect	0.1				
		Remove/ Install		0.2			
		Replace		0.2		31,32	
		Repair		0.2	11.2	31,32	
09	Recoil Mechanical Actuating Linear Adapter (Recoil Adapter) 11830567	Inspect	0.3	0.2			
		Test		0.2			
		Service	0.3				
		Remove/ Install	0.5				
		Replace	0.5				
		Repair	0.1	0.3	1.5		

(1) Group Number	(2) Component/Assembly	(3) Maint. Function	(4) Maint. Category			(5) Tool/ Equipment	(6) Remarks
			AVUM	AVIM	DEPOT		
0901	Gun Recoil Spindle 10503854	Inspect	0.1	0.8			D
		Adjust			0.9	16,31	
		Service		0.5		31	
		Remove/ Install		0.5		31	
		Replace		0.5		31	
		Repair			1.5	16,31	
010	Actuating Linear Slide Assembly (Slider) 11830565	Inspect	0.1				
		Service	0.3				
		Remove/ Install	0.5			31	
		Replace	0.5			31	
		Repair	0.1	0.3	0.9	31	
010A1	Linear Actuating Cylinder 11830560	Inspect	0.1	0.5			
		Remove/ Install		0.1		31	
		Replace		0.1		31	
		Repair		0.3		31	
011	Turret Assembly 11830962	Inspect	1.5			33	
		Test	1.5	1.7		33	
		Adjust	2.1	4.0		4,12,31,33	
		Aline		4.3		7,31,33	B
		Remove/ Install		8.5		5,14,18,31	
		Replace		8.5		11,14,18,31	
		Repair	2.1	5.3	9.0	29,31,32	
		Overhaul			79.5	29,31,32	
011A1	Resolver Support 11830554	Inspect	0.1	0.3		33	
		Adjust		0.5		31,33	
		Remove/ Install		2.0		31	
		Replace		2.0		31	
		Repair		0.5		31	
011A2	Adjustment Cam 116C3447	Inspect		0.1			
		Adjust		0.5		31,33	
		Remove/ Install		0.5		31	
		Replace		0.5		31	
		Repair		0.5		31,33	
01101	Electrical Resolver 11830568	Inspect	0.1	0.3		33	
		Test		0.2		33	
		Adjust		0.5		31,33	
		Remove/ Install		1.5		31	
		Replace		1.8		2,31	
		Repair		0.7		21,31	

(1) Group Number	(2) Component/Assembly	(3) Maint. Function	(4) Maint. Category			(5) Tool/ Equipment	(6) Remarks
			AVUM	AVIM	DEPOT		
01101A1	Resolver Support 11830555	Inspect		0.1		33	
		Adjust		0.5		31,32,33	
		Remove/ Install		1.0		31	
		Replace		1.0		31	
		Repair		0.5		31	
01101A2	Adjustment Cam, 116C3447	Inspect		0.1			
		Adjust		0.5		31,33	
		Remove/ Install		0.5		31	
		Replace		0.5		31	
		Repair		0.5		31,33	
01101A3	Azimuth Resolver Housing 11830558	Inspect	0.1		33		C
		Remove/ Install		0.5		2,31	
		Replace		0.5		31	
		Repair		0.5		31,33	
01102	Rotary Electro-Mechanical Actuator (Azimuth Drive) 11830569	Inspect	0.1	0.1		33	C
		Test	0.1	1.8		33	
		Adjust		0.7		3,31,33	
		Remove/ Install		0.7		31	
		Replace		1.0		3,31,33	
		Repair		0.5	12.0	31,32	
0110201	Direct Current Motor 101D4408	Inspect	0.1				K
		Test	0.1				C
		Remove/ Install		0.3		31	
		Replace		0.3		31	
		Repair			10.7	21,23,31	
0110201A1	Brake Assembly Cover B946BH028	Inspect			0.1		D
		Remove/ Install			0.2	31	
		Replace			0.2	31	
		Repair			1.5	31	
0110202	Azimuth Drive Matched Housing Assembly 11830570	Inspect	0.1				
		Remove/ Install		0.5		31	
		Replace		0.5		31	
		Repair		0.5	1.3	31	
0110202A1	Azimuth Drive Housing 11830557	Inspect	0.1				
		Replace		0.5		31	
		Repair		0.5	1.2	31	

(1) Group Number	(2) Component/Assembly	(3) Maint. Function	(4) Maint. Category			(5) Tool/ Equipment	(6) Remarks
			AVUM	AVIM	DEPOT		
01103	Weapon Saddle 11830977	Inspect	0.1	0.5	1.2		
		Replace		0.6	0.7	31,32	
		Repair		0.4	8.0	31,32	
01103A1	Rear Support Assembly 11830978	Inspect	0.1				D
		Replace		0.5		31,32	
		Repair		0.5		31,32	
01103A2	Ball Mount 139C7802	Inspect		0.1			D
		Replace		0.5		31,32	
		Repair		0.5		31,32	
01103A3	Cam Actuator 11830548	Inspect	0.1	0.2		31,32	D
		Replace		0.5		5,31,32	
		Repair		0.8		31,32	
0110301	Weapon Saddle 11830600	Inspect			0.8	31,32	D
		Replace			0.7	31,32	
		Repair			1.0	31,32	
01104	Lower Support Assembly 11830961	Inspect	0.1	0.3	1.5		
		Remove/ Install			1.5	31,32	
		Replace		1.5		31,32	
		Repair		1.5	2.0	27,31,32	
01104A1	Plate Spacer 135B6862	Inspect		0.1			D
		Replace		0.2		31,32	
		Repair		0.2		31,32	
01104A2	Cam Link 905D495	Inspect		0.1			D
		Replace		0.5		31,32	
		Repair		0.5		31,32	
01104A3	Support Bracket Assembly 11830957	Inspect		0.1			
		Remove/ Install		0.8		31,32	
		Replace		0.8		31,32	
		Repair		1.5		31,32	
01104A4	Cam Link Bracket 11830955	Inspect		0.1			
		Remove/ Install		0.7		31,32	
		Replace		0.7		31,32	
		Repair		0.9			
01104A5	Direct Current Motor 101D4408	Inspect	0.1				K
		Test	0.1				C
		Remove/ Install		0.3		21,31,32	
		Replace		0.3		21,31,32	
		Repair			10.7		

(1) Group Number	(2) Component/Assembly	(3) Maint. Function	(4) Maint. Category			(5) Tool/ Equipment	(6) Remarks
			AVUM	AVIM	DEPOT		
0110401	Emergency Stow Control Unit 205F457A 189F729B	Inspect	0.1				J,P
		Test	0.5			33	
		Remove/ Install	0.5			31,32	
		Replace	0.5			31	
		Repair		0.8	1.5	22,31,32	
0110401A1	Case Assembly 205F454	Inspect	0.1				D
		Repair		0.5	1.5	32	
011040101A	Circuit Card Assembly 205F419	Inspect		0.2			
		Test		0.1		33	
		Remove/ Install		0.5		31	
		Replace		0.5		31	
		Repair			1.0	21,23,33	
0110401B1	Case Assembly 189F730	Inspect	0.1				D
		Repair		0.2	1.5	22,32	
011040101B	Electronic Component Assembly 189F721	Inspect		0.2			
		Test		0.1		33	
		Replace			1.5	31	
		Repair			7.2	21,31,33	
011040102B	Electronic Component Assembly 176F234	Inspect		0.2			
		Test		0.1		33	
		Replace			0.5	31	
		Repair			1.7	21,31,33	
011040103B	Circuit Card Assembly 189F731	Inspect		0.2			
		Test		0.1		33	
		Replace		0.5		31	
		Repair			1.7	21,31,33	
0110402	Special Purpose Branched Cable Assembly 11830944	Inspect	0.1				
		Test		2.5		22,33	
		Remove/ Install		8.5		31,32	
		Replace		8.5		31,32	
		Repair		2.7	6.7	22,31,32	
0110403	Support Assembly 11830457	Inspect	0.1	0.2			
		Service		0.5		31,33	
		Remove/ Install			3.0	31,33	
		Replace		1.0		31,33	
		Repair		1.0	12.9	31,33	

(1) Group Number	(2) Component/Assembly	(3) Maint. Function	(4) Maint. Category			(5) Tool/ Equipment	(6) Remarks
			AVUM	AVIM	DEPOT		
0110403A1	Lower Support 11830456	Inspect	0.1	0.2			
		Remove/ Install			1.0		
		Replace		1.0			
		Repair			1.0		
0110403A2	Stop Bracket 101D4400	Inspect	0.1				
		Remove/ Install			0.5	31,33	
		Replace			0.5	31,33	
		Repair			1.5		
01105	Special Purpose Electrical Branched Cable Assembly 11830973	Inspect	0.1	0.5			
		Test		0.8		22,33	
		Remove/ Install		8.0		31	
		Replace		8.0		31,32	
		Repair		1.5	2.6	22,31,32	
01106	Special Purpose Electrical Branched Cable Assembly 11830546	Inspect	0.1	0.5			
		Test		0.7		22,33	
		Remove/ Install		8.0		31,32	
		Replace		8.0		31,32	
		Repair		1.5	2.6	22,31,32	
01107	Special Purpose Electrical Branched Cable Assembly 11830543	Inspect	0.1	0.8			
		Test		2.5		22,33	
		Remove/ Install		8.0		31,32	
		Replace		8.0		31,32	
		Repair		1.7	2.5	22,31,32	
01108	Special Purpose Electrical Branched Cable Assembly 11830585	Inspect	0.1	0.5			
		Test		2.5		22,33	
		Remove/ Install		8.0		31,32	
		Replace		8.0		31,32	
		Repair		1.7	2.5	22,31,32	
01109	Upper Matched Support Assembly 11830483	Inspect	0.1	0.1			
		Remove/ Install			1.5	31,32	
		Replace			1.5	31,32	
		Repair		0.5	11.5	31,32	
01109A1	Upper Support Assembly 11830484	Inspect	0.1	0.2			
		Remove/ Install			2.5	31,32	
		Replace			2.5	31,32	
		Repair			10.4	31,32	

(1) Group Number	(2) Component/Assembly	(3) Maint. Function	(4) Maint. Category			(5) Tool/ Equipment	(6) Remarks
			AVUM	AVIM	DEPOT		
01109A2	Stop Bracket 101D4400	Inspect	0.1	0.1			
		Remove/ Install			0.5	31,32	
		Replace			0.5	31,32	
		Repair			1.5	31,32	
012	Logic Control Unit 11830922	Inspect	0.1				
		Test	0.5	1.5		33	
		Remove/ Install	0.5			31,32	
		Replace	0.5			31,32	
		Repair		1.0	12.0	31,32	
012A1	Access Cover 11830533	Inspect	0.1	0.1			
		Remove/ Install		0.1		31,32	
		Replace		0.1		31,32	
		Repair		0.2		31,32	
012A2	Logic Control Unit Case 11830531	Inspect		0.1			D
		Repair			2.5	31,32	
01201	Circuit Card Assembly 11830441	Inspect		0.1			
		Test		0.2		33	
		Remove/ Install		0.3		31,32	
		Replace		0.3		31,32	
		Repair			3.0	31,32	
01202	Circuit Card Assembly 11830988	Inspect		0.1			
		Test		0.2		33	
		Remove/ Install		0.3		31,32	
		Replace		0.3		31,32	
		Repair			3.0		
01203	Circuit Card Assembly 11830724	Inspect		0.1			
		Test		0.2		33	
		Remove/ Install		0.3		31,32	
		Replace		0.3		31,32	
		Repair			3.0		
01204	Circuit Card Assembly 11830798	Inspect		0.1			
		Test		0.2		33	
		Remove/ Install		0.3		31,32	
		Replace		0.3		31,32	
		Repair			3.0	31,32	

(1) Group Number	(2) Component/Assembly	(3) Maint. Function	(4) Maint. Category			(5) Tool/ Equipment	(6) Remarks
			AVUM	AVIM	DEPOT		
01205	Circuit Card Assembly 11830797	Inspect		0.1			
		Test		0.2		33	
		Remove/Install		0.3		31,32	
		Replace		0.3		31,32	
		Repair			3.0	31,32	
01206	Circuit Card Assembly 11830758	Inspect		0.1			
		Test		0.2		33	
		Remove/Install		0.3		31,32	
		Replace		0.3		31,32	
		Repair			3.0	31,32	
013	Gun Control Assembly 11830418	Inspect	0.1				
		Test	0.5			33	
		Remove/Install	1.3			31,32	
		Replace	1.3			31,32	
		Repair		1.5		31,32	
		Overhaul			3.7		
013A1	Access Cover 114C3016	Inspect	1.0				D
		Remove/Install		0.5		31,32	
		Replace		0.5		31,32	
		Repair		1.0		31,32	
013A2	Case 11830419	Inspect	0.1				D
		Repair			2.0	31,32	
01301	Circuit Card Assembly 189F902	Inspect		0.1			
		Test		0.2		33	
		Remove/Install		0.3		31,32	
		Replace		0.3		31,32	
		Repair			3.0	31,32	
01302	Circuit Card Assembly 189F903	Inspect		0.1			
		Test		0.2		33	
		Remove/Install		0.3		31,32	
		Replace		0.3		31,32	
		Repair			3.0	31,32	
01303	Circuit Card Assembly 189F904	Inspect		0.1			
		Test		0.2		33	
		Remove/Install		0.3		31,32	
		Replace		0.3		31,32	
		Repair			3.0	31,32	

(1) Group Number	(2) Component/Assembly	(3) Maint. Function	(4) Maint. Category			(5) Tool/ Equipment	(6) Remarks
			AVUM	AVIM	DEPOT		
01304	Circuit Card Assembly 11830420	Inspect		0.1			
		Test		0.2		33	
		Remove/ Install		0.3		31,32	
		Replace		0.3		31,32	
		Repair			3.0	31,32	
01305	Circuit Card Assembly 11830497	Inspect		0.1			
		Test		0.2		33	
		Remove/ Install		0.3		31,32	
		Replace		0.3		31,32	
		Repair			3.0	31,32	
014	Turret Control Assembly 11830908	Inspect	0.1				
		Test	0.5			33	
		Adjust	0.3			31,33	
		Remove/ Install	1.0			31,32	
		Replace	1.0			31,32	
		Repair		2.5	8.5	31,32	
014A1	Excess Cover 189F825	Inspect	0.1	0.1			D
		Remove/ Install		0.1		31,32	
		Replace		0.1		31,32	
		Repair		0.2		31,32	
014A2	Access Cover 139C7971	Inspect	0.1	0.1			D
		Remove/ Install		0.1		31,32	
		Replace		0.1		31,32	
		Repair		0.2		31,32	
014A3	Access Cover 105D3293	Inspect	0.1	0.1			D
		Remove/ Install		0.1		31,32	
		Replace		0.1		31,32	
		Repair		0.1		31,32	
01401	Circuit Card Assembly 189F960	Inspect		0.2			
		Test		0.1		21,33	
		Remove/ Install		0.3		31,32	
		Replace		0.3		31,32	
		Repair			3.0	31,32	
01402	Circuit Card Assembly 11830909	Inspect		0.2			
		Test		0.1		21,33	
		Remove/ Install		0.3		31,32	
		Replace		0.3		31,32	
		Repair			3.0	31,32	

(1) Group Number	(2) Component/Assembly	(3) Maint. Function	(4) Maint. Category			(5) Tool/ Equipment	(6) Remarks
			AVUM	AVIM	DEPOT		
01403	Circuit Card Assembly 11830800	Inspect		0.2			I
		Test		0.1		33	
		Remove/ Install		0.3		31,32	
		Replace		0.3		31,32	
		Repair			3.0	31,32	
01404	Electronic Components Assembly 139C7957	Inspect			0.1		
		Remove/ Install			0.2	31,32	
		Replace		0.5		31,32	
		Repair			0.2	31,32	
0140401	Power Supply Subassembly 139C7958	Inspect			0.1		
		Remove/ Install			0.2	31,32	
		Replace			0.2	31,32	
		Repair			0.2	31,32	
0140401A1	Electrical Heat Sink 105D3292	Inspect			0.1		
		Test			0.5	23	
		Remove/ Install			0.1	31,32	
		Replace			0.1	31,32	
		Repair			0.1	31,32	
01405	Printed Circuit Board Assembly 11830799	Inspect		0.1			
		Test		0.2		33	
		Remove/ Install		0.3		31,32	
		Replace			0.3	31,32	
		Repair			3.0	31,32	
01406	Electronic Component Assembly 132D1354	Inspect		0.1			
		Test		0.2		33	
		Remove/ Install		0.5		31,32	
		Replace		0.5		31,32	
		Repair			2.0	31,32	
01407	Wiring Harness 11831129	Inspect		1.5			
		Test		1.5		23,33	
		Remove/ Install		0.8		31,32	
		Replace		0.8		31,32	
		Repair			2.7	31,32	
01408	Special Purpose Branched Wiring Harness 11831130	Inspect		0.1			
		Test		0.5		22,33	
		Remove/ Install		0.5		31,32	
		Replace		0.5		31,32	
		Repair		0.8	1.2	31,32	

(1) Group Number	(2) Component/Assembly	(3) Maint. Function	(4) Maint. Category			(5) Tool/ Equipment	(6) Remarks
			AVUM	AVIM	DEPOT		
01409	Case Assembly 189F819	Inspect	0.1				D
		Repair		0.2	2.5	31,32	
015	Ammunition Feed System 11830886	Inspect	0.5				
		Test	0.5				L
		Remove/ Install	1.5			19,31,32	
		Replace	1.5			31,32	
		Repair	2.3	4.5		31,32	
		Overhaul			8.0	31,32	
01501	Feed Chute 11830873	Inspect	0.1				
		Remove/ Install	0.3			31	
		Replace	0.3			31	
		Repair	4.0			31	
01502	Special Purpose Electrical Power Cable Assembly 11830940	Inspect	0.1				
		Test	0.3	1.0		22	
		Remove/ Install	0.3			31	
		Replace	0.3			31	
		Repair		0.5	1.5	31	
01503	Ammunition Box Assembly 11830885	Inspect	0.1				
		Remove/ Install	0.3			31,32	
		Replace	0.3			31,32	
		Repair	1.5	2.0	8.0	31,32	
0150301	Ammunition Box Cover Assembly 11830884	Inspect	0.1				
		Remove/ Install	0.1			31,32	
		Replace	0.1			31,32	
		Repair	0.5	0.5	2.0	31,32	
015030101	Booster Assembly 11830881	Inspect	0.1				
		Test	0.3				
		Remove/ Install	0.2			31,32	
		Replace	0.2			31,32	
		Repair	0.3		2.0	31,32	
015030101A1	Mechanical Drive Housing (Booster) 11830858	Inspect	0.2				
		Remove/ Install	0.3			31,32	
		Replace	0.3			31,32	
		Repair	0.5			31,32	
01503010101	Direct Current Motor 105D3303	Inspect	0.1				
		Test	0.5				
		Remove/ Install	0.7			31,32	
		Replace	0.2			31,32	
		Repair			4.0	31,32	

(1) Group Number	(2) Component/Assembly	(3) Maint. Function	(4) Maint. Category AVUM	AVIM	DEPOT	(5) Tool/ Equipment	(6) Remarks
01503010111	DC Motor Assembly C091CH034	Inspect			0.1		
		Test			0.5		
		Remove/ Install			0.2	31,32	
		Replace			0.2	31,32	
		Repair			4.0	31,32	
01503010112	Gear Box Assembly C091CH057	Inspect			0.1		
		Remove/ Install			0.5	31,32	
		Replace			0.5	31,32	
		Repair		2.0		31,32	
0150302	Box Subassembly 11830893	Inspect	0.1				
		Remove/ Install	0.1			31,32	
		Replace	0.1			31,32	
		Repair	1.0		5.0	31,32	
015030201	Ammunition Box 11830895	Inspect	0.1				
		Remove/ Install	0.1	0.1		31,32	
		Replace	0.1			31,32	
		Repair	1.0	2.0	3.0	31,32	
015030201A1	Box 11830894	Inspect	0.1				D
		Replace		0.1		31,32	
		Repair		2.0	2.0	31,32	
016	Gunner Panel Assembly 209-175-338-1 L56 Armament Gunners Control 209-075-768-1 L55	Inspect	0.1				J
		Test	0.5			33	
		Remove/ Install	0.7			31,32	
		Replace	0.7			31,32	
		Repair	0.1	2.5	6.8	31,32	
016A1	Harness Assembly 209-175-338-7 L56 209-075-768-7 L55	Inspect		0.1			
		Test		1.2		22,33	
		Replace		0.5		31,32	
		Repair		1.5		31,32	
016A2	Special Purpose Electrical Cable Assembly 209-075-086-115 L56 209-075-076-15 L55	Inspect		0.1			
		Test		0.5		22,33	
		Replace		0.5		31,32	
		Repair		0.5		31,32	
016A3	Special Purpose Electrical Cable Assembly 209-075-078-19	Inspect		0.1			
		Test		0.5		22,33	
		Replace		0.5		31,32	
		Repair		0.5		31,32	

(1) Group Number	(2) Component/Assembly	(3) Maint. Function	(4) Maint. Category			(5) Tool/ Equipment	(6) Remarks
			AVUM	AVIM	DEPOT		
016A4	Relay Assembly	Inspect		0.1			D
	209-075-933-9	Test		0.2		22,33	
		Replace		0.5		31,32	
016A5	Push Switch 120-121-5	Inspect		0.1			D
		Test		0.1		33	
		Replace		0.5		31	
016A6	Push Switch 120-121-1	Inspect		0.1			D
		Test		0.1		33	
		Replace		0.5		31	
016A7	Push Switch 120-121-6	Inspect		0.1			D
		Test		0.1		33	
		Replace		0.5		31	
016A8	Chassis Assembly	Inspect		0.1			D
	209-175-337-1 L56	Repair			0.5	31,32	
	209-075-769-1 L55						
017	Pilot Panel Assembly	Inspect	0.1				
	209-175-339-1 L56	Test	0.5			33	
	Pilot Armament Control Panel Assembly	Remove/ Install	0.7			31,32	
	209-075-771-1 L55	Replace	0.7			31,32	
		Repair	0.5	1.3		31,32	
		Overhaul			5.5	31,32	
017A1	Harness Assembly	Inspect		0.1			
	209-175-339-7 L56	Test		0.5		33	
	209-075-771-7 L55	Replace		0.5		31,32	
		Repair		1.5			
017A2	Special Cable Assembly	Inspect		0.1			
	209-075-086-117 L56	Test		0.5		33	
	209-075-076-17 L55	Replace		0.5		31,32	
		Repair		1.5		31,32	
017A3	Special Cable Assembly	Inspect		0.1			
	209-075-078-17	Test		0.5		33	
		Replace		0.5		31,32	
		Repair		1.5		31,32	
017A4	Relay Assembly	Inspect		0.1			D
	209-075-933-9	Test		0.5		33	
		Replace		0.5		31,32	
017A5	Plate Assembly	Inspect		0.1			D
	209-075-772-1	Remove		0.5		31,32	
		Replace		0.5	1.0	31,32	

(1) Group Number	(2) Component/Assembly	(3) Maint. Function	(4) Maint. Category			(5) Tool/ Equipment	(6) Remarks
			AVUM	AVIM	DEPOT		
018	Interface Control Unit Assembly 209-074-110-1 L56 209-074-051-3 L55	Inspect	0.1				
		Test	0.5			33	
		Adjust		0.5		31	
		Remove/ Install	0.5			31,32	
		Replace	0.5			31,32	
		Repair		1.5		31,32	
		Overhaul			8.9	31,32	
018A1	Enclosure Assembly 209-074-112-1	Inspect		0.1			
		Remove/ Install		0.5		31,32	
		Replace			0.5	31,32	
		Repair		0.5	1.5	31,32	
018A2	Special Purpose Branched Cable Assembly 209-074-076-11 L55	Inspect		0.1			
		Test		0.5		33	
		Replace			0.5	31,32	
		Repair		0.5	1.5	31,32	
018A3	Cable Assembly 209-074-076-13 L55	Inspect		0.1			
		Test		0.5		33	
		Replace			0.5	31,32	
		Repair		0.5	1.5	31,32	
01801	Printed Wiring Board Assembly 209-074-119-1 L56	Inspect		0.1			
		Test		0.5		33	
		Remove/ Install		0.5		31,32	
		Replace		0.5		31,32	
		Repair			3.0	31,32	
01802	Printed Wiring Board Assembly 209-074-126-1 L56	Inspect		0.1			
		Test		0.5		33	
		Remove/ Install		0.5		31,32	
		Replace		0.5		31,32	
		Repair			3.0	31,32	
01803	Printed Wiring Board Assembly 209-074-117-1 L56	Inspect		0.1			
		Test		0.5		33	
		Remove/ Install		0.5		31,32	
		Replace		0.5		31,32	
		Repair			3.0	31,32	
01804	Printed Wiring Assembly 209-074-115-1 L56	Inspect		0.1			
		Test		0.5		33	
		Remove/ Install		0.5		31,32	
		Replace		0.5		31,32	
		Repair			3.0	31,32	

(1) Group Number	(2) Component/Assembly	(3) Maint. Function	(4) Maint. Category			(5) Tool/ Equipment	(6) Remarks
			AVUM	AVIM	DEPOT		
01805	Printed Circuit Board Assembly	Inspect		0.1			
	209-074-025-3 L55	Test		0.5		33	
		Remove/Install		0.5		31,32	
		Replace		0.5		31,32	
		Repair			3.0	31,32	
01806	Circuit Card Assembly	Inspect		0.1			
	209-074-060-3 L55	Test		0.5		33	
		Remove/Install		0.5		31,32	
		Replace		0.5		31,32	
		Repair			3.0	31,32	
01807	Circuit Card Assembly	Inspect		0.1			
	209-074-077-1 L55	Test		0.5		33	
		Remove/Install		0.5		31,32	
		Replace		0.5		31,32	
		Repair			3.0	31,32	
01808	Resolver Mount Assembly	Inspect		0.1			
	209-074-020-1 L55	Test		0.5		33	
		Adjust		2.0		31,33	
		Remove/Install		0.5		31,32	
		Replace		0.5		31,32	
		Repair			1.5	31,32	
01809	Enclosure Assembly	Inspect		0.1			D
	209-074-053-1 L55	Replace			0.5	31,32	
		Repair			1.5	31,32	
01809A1	Cover Assembly	Inspect	0.1				
	209-074-053-7 L55	Remove/Install		0.5		31,32	
		Replace		0.5		31,32	
		Repair		0.5	1.0	31,32	
01809A2	Support Assembly	Inspect		0.1			D
	209-074-053-15 L55	Replace			0.5	31,32	
		Repair		0.5	1.5	31,32	
01809A3	Support Assembly	Inspect		0.1			D
	209-074-053-11 L55	Replace			0.5	31,32	
		Repair		0.5	1.5	31,32	
01809A4	Box Assembly	Inspect		0.1			D
	209-074-053-3 L55	Replace			0.5	31,32	
		Repair			2.0	31,32	
01809A5	Support Assembly	Inspect		0.1			D
	209-074-053-19 L55	Replace			0.5	31,32	
		Repair		0.5	1.5	31,32	

(1) Group Number	(2) Component/Assembly	(3) Maint. Function	(4) Maint. Category AVUM	AVIM	DEPOT	(5) Tool/ Equipment	(6) Remarks
01809A6	Cover Assembly 209-074-053-21 L55	Inspect		0.1			D
		Replace		0.5		31,32	
		Repair		0.5	1.5	31,32	
01809A7	Support Assembly 209-074-053-5 L55	Inspect		0.1			D
		Replace			0.5	31,32	
		Repair		0.5	1.5	31,32	
01809A8	Cover Assembly 209-074-053-9 L55	Inspect		0.1			D
		Replace		0.5		31,32	
		Repair		0.5	1.5	31,32	
01809A9	Bracket Assembly 209-074-053-13	Inspect		0.1			D
		Replace			0.5	31,32	
		Repair		0.5	1.5	31,32	
01809A10	Support Assembly 209-074-053-17	Inspect		0.1			
		Replace			0.5	31,32	
		Repair		0.5	1.5	31,32	
01810	Interface Control Unit Decals L56	Inspect		0.1			D
		Replace			0.5	31	
01811	Interface Control Unit Decals L55	Inspect		0.1			
		Replace			0.5	31	
019	Turret Buffer Amplifier Assembly 209-074-140-101 L56	Inspect	0.1				C
		Test	0.5				
		Remove/ Install	1.5			31	
		Replace	1.5			31	
		Overhaul			9.7	21,31,32	
01901	Circuit Card Assembly 209-074-141-101 L56	Inspect			1.0		
		Test			1.5	21	
		Replace			0.5	31,32	
		Repair			1.5	31,32	
020	Relay Assembly 209-175-352-101 L56	Inspect	0.1				
		Test		1.0		22	
		Remove/ Install	1.0			31,32	
		Replace	1.0	1.5		31,32	
		Repair		1.5	3.9	31,32	
020A1	Cover Assembly 209-175-353-103 L56	Inspect	0.1				D
		Remove/ Install		0.5		31,32	
		Replace		0.5		31,32	
		Repair			0.5	31,32	
020A2	Cable Assembly 209-175-702-101 L56	Inspect		0.5			
		Test		0.9		22	
		Repair			3.5	31,32	

(1) Group Number	(2) Component/Assembly	(3) Maint. Function	(4) Maint. Category			(5) Tool/ Equipment	(6) Remarks
			AVUM	AVIM	DEPOT		
02001	Printed Wiring Board Assembly 209-175-700-101 L56	Inspect		0.1			
		Test		0.5		22	
		Remove/ Install		0.5		31,32	
		Replace		0.5		31,32	
		Repair			3.0	31,32	
	MAINTENANCE ALLOCATION MISCELLANEOUS ITEMS						
9301	Universal Boresight Kit 11830730	Inspect	0.1				D
		Remove/ Install	0.2			31,32	
		Replace	0.2			31,32	
		Repair	0.5		6.0	31,32	
9301A1	30-mm Boresight Muzzle Adapter 11830733	Inspect	0.1				D
		Replace	0.1			31	
		Repair			2.0	31,32	
09301A2	7.62-mm Boresight Muzzle Adapter 11830735	Inspect	0.1				D
		Replace	0.1			31,32	
		Repair			2.0	31,32	
9301A3	20-mm Boresight Muzzle Adapter 11830731	Inspect	0.1				D
		Replace	0.1			31	
		Repair			2.0	31	
9302	Recoil Adapter Special Preload Gage 101D4561	Inspect		0.1			D
		Replace		0.5		31,32	
		Repair		0.5	1.5	31,32	
9302A1	Adapter Block 101D4790	Inspect		0.1			
		Replace		0.5		31,32	
		Repair		0.5		31,32	
9303	Clutch Adjuster Holding Fixture 101D4844	Inspect		0.1			D
		Service		0.5			
		Repair		0.5		31,32	
9304	Feed Unit Fixture, M89E1 11838602	Inspect		0.1			D
		Service		0.1		31	
		Replace	0.1			31,32	
		Repair		0.5	1.0	31,32	
9304A1	Checking Fixture Case Assembly 11838612	Inspect		0.1			D
		Replace		0.5		31,32	
		Repair		1.0		31,32	

(1) Group Number	(2) Component/Assembly	(3) Maint. Function	(4) Maint. Category			(5) Tool/ Equipment	(6) Remarks
			AVUM	AVIM	DEPOT		
9304A2	Checking Fixture Assembly 11838604	Inspect	0.1	0.1			D
		Replace		0.1		31,32	
		Repair		0.5		31,32	
9305	Power Supply Assembly 11834203	Inspect		0.1			D
		Test		0.5		22,31	
		Adjust		0.5		22,31	
		Repair		0.5		31,32	
9306	Handling Mounting Gun Adapter 8444095	Inspect	0.1				D
		Replace	0.5			31,32	
		Repair	0.5			31,32	
9307	Boresight Kit	Inspect		0.6			Q
		Test		0.5			
		Service		0.5			
		Replace		0.4			
		Repair		0.5			
		Overhaul			X		
9307A	Boresight Assembly	Inspect		1.4			
		Aline		1.5			
		Service		1.5			
		Replace		1.3			
		Repair		1.2			
9307A01	Main Frame Assembly	Replace		0.5			
		Repair		0.2	10.1		
9307A0101	Block Frame Assembly	Replace			0.5		
		Repair		8.0			
9307A0102	Block Assembly	Replace			0.3		
		Repair		2.0			
9307A0103	Right Hand Block Assembly	Replace			0.3		
		Repair			2.0		
9307A0104	Block Assembly	Replace			0.3		
		Repair			2.0		
9307A0105	Left Hand Block Assembly	Replace			0.3		
		Repair			2.0		
9307A0106	Telescope Sight Unit Block Assembly	Replace			0.3		
		Repair			2.0		
9307A0107	Block Assembly Alinement	Replace			0.3		
		Repair			2.0		
9307A02	Right Hand Frame Assembly	Replace		0.2			
		Repair		0.2	4.0		

(1) Group Number	(2) Component/Assembly	(3) Maint. Function	(4) Maint. Category AVUM	AVIM	DEPOT	(5) Tool/ Equipment	(6) Remarks
9307A0201	Alinement Assembly	Replace Repair		0.2 0.2	 3.0		
9307A020101	Right Hand Block Assembly	Replace Repair		0.2 0.2	 2.0		
9307A020102	Alinement Assembly	Replace Repair		0.4 0.3	 2.0		
9307A020103	Right Hand Frame Assembly	Replace Repair		0.2 0.2	 3.0		
9307A03	Left Hand Frame Assembly	Replace Repair		0.2 0.2	 4.0		
9307A0301	Left Hand Alinement Assembly	Replace Repair		0.2 0.2	 3.0		
9307A030101	Left Hand Block Assembly	Replace Repair		0.2 0.2	 2.0		
9307A030102	Alinement Assembly	Replace Repair		0.4 0.3	 2.0		
9307A030103	Left hand Frame Assembly	Replace Repair		0.2 0.2	 3.0		
9307A04	Forward Frame Assembly	Replace Repair		0.2 0.2	 3.5		
9307A0401	Forward Gun Alinement Assembly	Replace Repair		0.2 0.2	 3.0		
9307A040101	Block Assembly	Replace Repair		0.2 0.2	 2.0		
9307A040102	Alinement Assembly	Replace Repair		0.4 0.3	 2.0		
9307A040103	Forward Gun Frame Assembly	Replace Repair		0.2 0.2	 3.0		
9307A05	Upper Frame Assembly	Replace Repair		0.2 0.2	 3.0		
9307A0501	Block Assembly	Replace Repair		0.2 0.2	 2.0		
9307A0502	Upper Plate Assembly	Replace Repair		0.2 0.2	 2.0		
9307A0503	Upper Frame Assembly	Replace Repair		0.2 0.2	 3.5		

(1) Group Number	(2) Component/Assembly	(3) Maint. Function	(4) Maint. Category			(5) Tool/ Equipment	(6) Remarks
			AVUM	AVIM	DEPOT		
9307A06	Gun Alinement Assembly	Replace		0.2			
		Repair		0.4	3.0		
9307A0601	Shank Assembly	Replace		0.3			
		Repair		0.2	2.0		
9307A0602	Housing Assembly	Replace			0.3		
		Repair			2.0		
9307A07	Mounting Alinement Frame Assembly	Replace		0.5			
		Repair		0.4	4.0		
9307A0701	Slider Assembly	Service		0.1			
		Replace		0.2			
		Repair		0.2	2.0		
9307A0702	Slider Assembly	Service		0.2			
		Replace		0.7			
		Repair		0.4	3.0		
9307A0703	Slider Assembly	Service		0.1			
		Replace		0.7			
		Repair		0.2	2.0		
9307A0704	Frame Assembly	Replace		1.0			
		Repair		0.2	6.0		
9307A0705	Frame Fixed	Replace		0.8			
		Repair		0.2	6.0		
9307A08	Handle Assembly	Replace		0.1			
		Repair		0.2	2.0		
9307A09	Alinement Device	Replace		0.1			
		Repair		0.2	1.5		
9307A0901	Base Assembly	Replace		0.1			
		Repair		0.2	2.0		
9307A10	Alinement Device	Replace		0.1			
		Repair		0.2	2.0		
9307A11	Tow Missile Alinement Assembly	Replace		0.1			
		Repair		0.3	3.0		
9307A1101	Body Assembly	Replace			0.8		
		Repair			3.0		
9307A12	Alinement Device Assembly	Replace		0.1			
		Repair		0.3	4.0		
9307A13	Cable Assembly	Replace		0.1			
		Repair		0.1	3.0		

(1) Group Number	(2) Component/Assembly	(3) Maint. Function	(4) Maint. Category			(5) Tool/ Equipment	(6) Remarks
			AVUM	AVIM	DEPOT		
9307A14	Unit Illumination Cable Assembly	Replace		0.1			
		Repair		0.4	3.0		
9307A15	Alinement Device Assembly	Replace		0.1			
		Repair		0.2	3.0		
9307A1501	Block Alinement Device	Replace		0.1			
		Repair		0.2	3.0		
9307A16	Mirror Assembly	Replace		0.1			
		Repair		0.2	2.0		
9307A17	Alinement Device	Replace		0.1			
		Repair		0.2	2.0		
9307A18	Pilot Shelf Assembly	Replace		0.1			
		Repair		0.3	3.0		
9307A1801	Clevis Assembly	Replace		0.2			
		Repair		0.2	1.0		
9307A19	Pedestal Assembly Alinement	Replace		0.2			
		Repair		0.2	4.0		
9307A1901	Magnet Assembly	Replace			0.2		
		Repair			0.2		
9307A1902	Pedestal Assembly	Replace			0.2		
		Repair			6.0		
9307A20	Gunner Shelf Assembly	Replace		0.2			
		Repair		0.4	4.0		
9307A2001	Clevis Assembly	Replace		0.2			
		Repair		0.2	1.0		
9307A2002	Clevis Assembly	Replace		0.2			
		Repair		0.2	1.5		
9307A200201	Clevis Assembly	Replace		0.3			
		Repair		0.2	1.0		
9307A2003	Clevis Base Assembly	Replace		0.2			
		Repair		0.2	1.5		
9307A200301	Clevis Base Assembly	Replace		0.3			
		Repair		0.2	1.0		
9307A21	Stand Assembly	Replace		0.2			
		Repair		0.5	6.0		
9307A2101	Brace Assembly	Replace		0.2			
		Repair		0.2	1.0		

(1) Group Number	(2) Component/Assembly	(3) Maint. Function	(4) Maint. Category			(5) Tool/ Equipment	(6) Remarks
			AVUM	AVIM	DEPOT		
9307A210101	Brace Assembly	Replace		0.2			
		Repair		0.2	1.0		
9307A2102	Base Assembly	Replace		0.4			
		Repair		0.5	3.0		
9307A2103	Vertical Support	Replace		0.3			
		Repair		0.3	4.0		
9307B	Transportation Case Assembly	Replace		0.1			
		Repair		2.0			
9307C	Transportation Case Assembly	Replace		0.1			
		Repair		2.0			
9307D	Transportation Case Assembly	Replace		0.1			
		Repair		2.0			
9307E	Transportation Case Assembly	Replace		0.1			
		Repair		2.0			
9307F	Transportation Case Assembly	Replace		0.1			
		Repair		2.0			
9307G	Transportation Case Assembly	Replace		0.1			
		Repair		2.0			
9307H	Transportation Case Assembly	Replace		0.1			
		Repair		2.0			
9308	**Boresight Targets**	**Inspect**		**0.6**			
	Standard Assemblies	**Repair**		**0.5**			

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

Reference Code	Maintenance Level	Nomenclature	National Stock Number	Tool Part Number
1	F,D	Range Potentiometer Torque Adapter	Fabricated Item	
2	F	Azimuth Resolver Shim Wands (Min, Max)	Fabricated Item	
3	F	Azimuth Drive Assembly Shim Wands (Min, Max)	Fabricated Item	
4	F	Backlash Tool	1005-01-174-9265	217F938
5	F,D	Bearing Removal Tools	Fabricated Item	

Reference Code	Maintenance Level	Nomenclature	National Stock Number	Tool Part Number
6	O,F,D	Bolt Head Lock Installation Tool	Fabricated Item	
7	F,D	Boresight Assembly Ground Support Equipment	4931-01-084-3750	T-102300-101
8	O,F,D	Universal Boresight Kit	4931-01-064-3530	11830730
9	O	Small Arms Cleaning Brush	1005-00-610-8828	6108828
10	O	Small Arms Cleaning Brush	1005-00-722-5087	8225087
11	F	Circuit Card Puller	Fabricated Item	
12	F,D	Clutch Adjuster Holding Fixture	1005-00-139-6178	10104814
13	O,F,D	Feeder Checking Fixture	1005-00-433-2838	11838602
14	F,D	Turret Installation/ Removal Fixture	Fabricated Item	
15	O	20-mm Barrel Erosion Gage	4933-01-068-8007	167C-2209
16	F,D	Recoil Adapter Preload Gage	5210-00-470-5267	101D4561
17	O	Mounting/Handling Gun Adapter	4933-00-199-7331	8444095
18	F,D	5 Ton Tripod Hydraulic Jack Type BS	1730-00-516-2018	
19	O	M25 Linker-Delinker	4925-00-787-9803	7790853
20	O	Heat Protective Mittens	8415-00-266-8843	MIL-M-11199
21	D	Multimeter ME-26/U	6625-00-913-9781	
22	O,F,D	Multimeter AN/USM-223	6625-00-999-7465	
23	F,D	Oscilloscope AN/USM-281-C	6525-00-106-9622	
24	F,D	Distribution Panel	4933-00-916-9582	12007200
25	F,D	Power Supply	4933-01-068-8735	11834203
26	O	Small Arms Cleaning Rod	1005-00-650-8210	8766012
27	F	Saddle Bearing Installation/ Removal Tools (4 ea.)	Fabricated Item	
28	F	Division Armament Repair Shop Set, AVIM (Airmobile)	4933-00-122-6771	

Reference Code	Maintenance Level	Nomenclature	National Stock Number	Tool Part Number
29	F	Division Fire Control Repair Shop Set AVIM (Airmobile)	4931-00-122-7088	
30	O	Gun Lifting Sling	Fabricated Item	
31	O,F,D	Basic Aircraft Armament Repairman Tool Set	4933-00-987-9816	
32	O,F,D	Supplemental Aircraft Armament Repairman Tool Set	4933-00-994-9242	
33	O,F,D	Electronics Systems Test Set, M137	4933-01-063-7678	11830700
34	F,D	Machine Plug Wrench	Fabricated Item	
35	F,D	Elevation/Depression Knob Torque Adapter	Fabricated Item	

Section IV. REMARKS

Reference Code	Remarks
A	Power equipment (Section III, items 24 and 25) is required for use of the M137 test set at the AVIM and DEPOT maintenance levels.
B	Alinement time is approximate as boresighting interfaces with other equipment (reference composite boresight procedures).
C	Component or assembly is tested during system functional test or next higher assembly test.
D	Although this item is not maintenance significant it is functionally required.
E	See TM 9-1090-207-13&P for tool/equipment and complete MAC.
F	See TM 9-1270-212-14&P for tool/equipment and complete MAC.
G	See TM 9-1270-220-13&P for tool/equipment and complete MAC.
H	See TM 9-1270-218-13&P for tool/equipment and complete MAC.
I	The A3 and A4 circuit cards are functionally interchangeable.

Reference Code	Remarks
J	Components are functionally the same but require separate repair parts/ procedures.
K	Azimuth and elevation drive motors are functionally interchangeable.
L	Item 19 of Section II is required during loading of the ammunition system.
M	Item 20 of Section II is required during hot barrel removal.
N	See TM 9-1270-219-13&P for tool/equipment and complete MAC.
O	Only motor 5911320-1 has brush kit (AVIM).
P	Items are functionally interchangeable but cannot be installed at the same time.
Q	See TM 9-4931-583-30&P for tool/equipment.

NOTE

Designator code L56 is assigned to items peculiar to Armament Subsystem M97A2. Designator code L55 is assigned to items peculiar to Armament Subsystem M97A1.

APPENDIX C

REPAIR PARTS AND SPECIAL TOOLS LIST

Refer to TM 9-1090-206-23P for repair parts and special tools.

APPENDIX D

EXPENDABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

SCOPE

D-1. This appendix lists expendable supplies and materials you will need to operate and maintain the Armament Subsystem. These items are authorized to you by CTA 50-970, Expendable Items.

EXPLANATION OF COLUMNS

D-2. An explanation of columns is provided below.

a. Column 1, Item number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use adhesive coating, item 1, Appx D".)

b. Column 2, Level. This column identifies the lowest level of maintenance that requires the listed item.

O — Aviation Unit
F — Aviation Intermediate Maintenance

c. Column 3, National Stock Number. This is the National stock number assigned to the item; use it to request or requisition the item.

d. Column 4, Description. Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the part number followed by the Federal Supply Code for Manufacturer (FSCM) in parentheses, if applicable.

e. Column 5, Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea. in. pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

Section II. EXPENDABLE SUPPLIES AND MATERIALS

(1) Number	(2) Level	(3) National Stock Number	Description	U/M
1	O	8040-00-281-1972	Adhesive, Rubber Base, General Purpose (19204)	gl
2	O	6850-00-224-6663	Cleaning Compound Rifle Bore Cleaner (81349) MIL-C-372	oz
3	O	9150-00-985-7244	Grease, Aircraft (81349) MIL-G-23827	oz
4	O	9505-00-221-2650	Lockwire (96906) MS20995C20	lb
5	O	9505-00-293-4208	Lockwire (96906) MS20995C32	lb
6	O	9150-01-104-5227	Lubricant, All Weather (Automatic Weapons) (DOD-L-85336)	qt
7	O	9150-00-168-2000	Lubricant, Solid-Film, Air-Cured (Corrosion-Inhibiting)	oz
8	O	4510-00-220-6078	Lumber, Softwood (1 x 4)	bf
9	O	5510-00-274-5297	Lumber, Softwood (4 x 4)	bf
10	O	9150-00-292-9689	Oil, Lubricating (81349) MIL-L-14107	qt
11	O	8010-01-042-9438	Paint, Lacquer (81349) MIL-L-46159A	cn
12	O	6850-00-264-9039	Solvent, Mineral Spirit (81349) P-D-680	gl

(1) Number	(2) Level	(3) National Stock Number	Description	U/M
13	O	6810-00-753-4993	Alcohol, Isopropyl	oz
14	O	5350-00-161-9066	Cloth, Abrasive (100 grit)	pk
15	O	5350-00-161-9715	Cloth, Abrasive (240 grit)	pk
16	O	9150-01-071-0749	Grease, Aircraft Ord Graphite	lb

APPENDIX E

ILLUSTRATED LIST OF MANUFACTURED ITEMS

INTRODUCTION

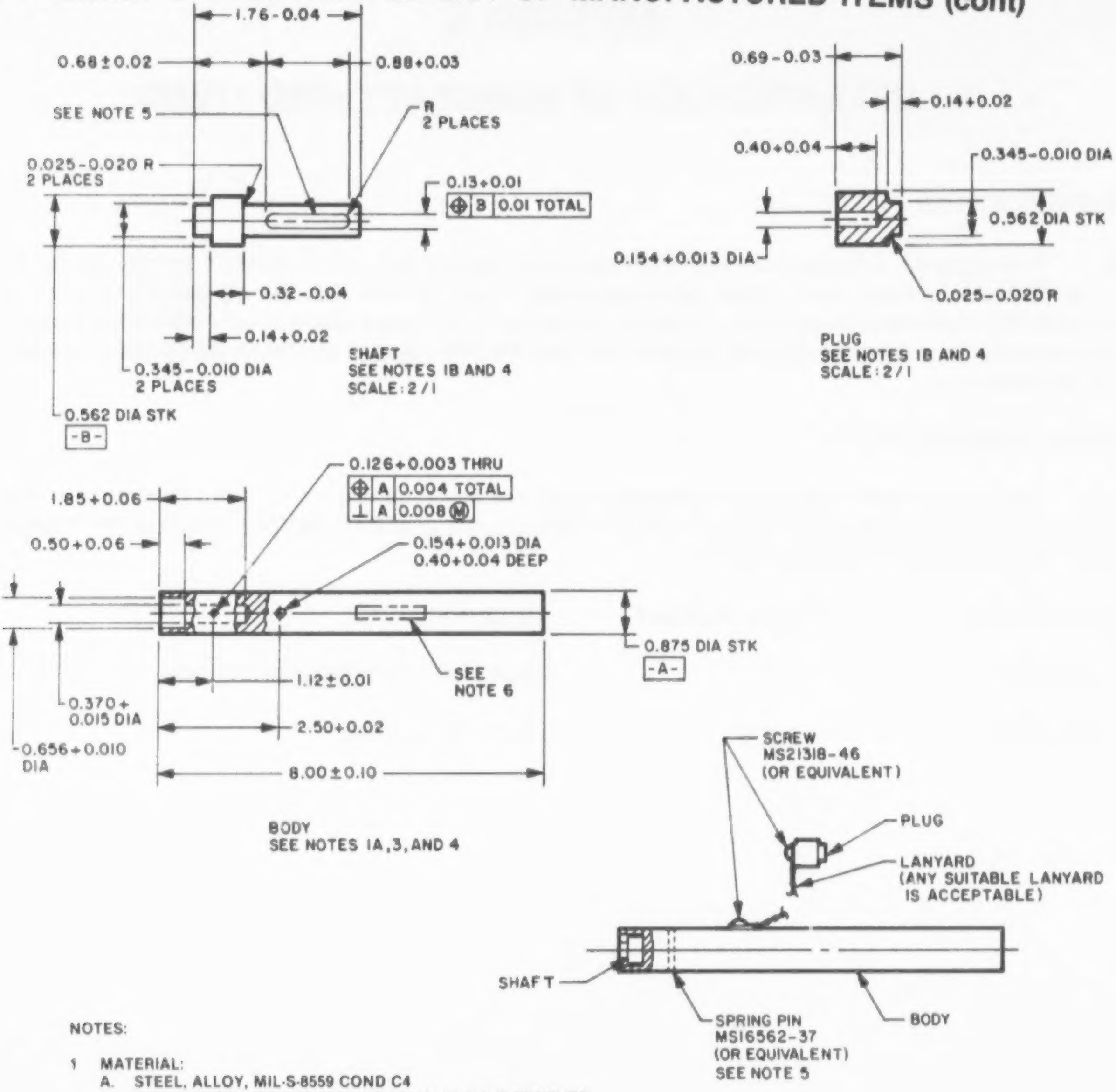
E-1. This appendix includes complete instructions for making items authorized to be manufactured or fabricated by aviation unit maintenance personnel. A part number index in alphanumeric order is provided for cross-referencing the part number of the item to the figure which covers fabrication criteria. All bulk materials needed for manufacture of an item are identified by part number or specification number on the illustration.

PART NUMBER INDEX

E-2. The part number index contains the part numbers of all manufactured items illustrated in this appendix. The part numbers are listed in alphanumeric order and are cross-referenced to the illustration which provides fabrication criteria.

Part Number	Figure Number	Nomenclature
UMI 1001	E-1	Bolt Head Lock Installation Tool
UMI 1002	E-2	Gun Lifting Sling

APPENDIX E - ILLUSTRATED LIST OF MANUFACTURED ITEMS (cont)


1.76-0.04
0.68±0.02
0.88+0.03
SEE NOTE 5
R
2 PLACES
0.025-0.020 R
2 PLACES
0.13+0.01
⊕ B 0.01 TOTAL
0.32-0.04
0.14+0.02
0.345-0.010 DIA
2 PLACES
SHAFT
SEE NOTES 1B AND 4
SCALE: 2/1
0.562 DIA STK
-B-
0.69-0.03
0.14+0.02
0.40+0.04
0.345-0.010 DIA
0.562 DIA STK
0.154+0.013 DIA
0.025-0.020 R
PLUG
SEE NOTES 1B AND 4
SCALE: 2/1
0.126+0.003 THRU
⊕ A 0.004 TOTAL
⊥ A 0.008 Ⓜ
1.85+0.06
0.50+0.06
0.154+0.013 DIA
0.40+0.04 DEEP
0.875 DIA STK
-A-
1.12±0.01
SEE
NOTE 6
0.370+
0.015 DIA
2.50+0.02
0.656+0.010
DIA
8.00±0.10
BODY
SEE NOTES 1A, 3, AND 4
SCREW
MS21318-46
(OR EQUIVALENT)
PLUG
LANYARD
(ANY SUITABLE LANYARD
IS ACCEPTABLE)
SHAFT
BODY
SPRING PIN
MS16562-37
(OR EQUIVALENT)
SEE NOTE 5

NOTES:

1 MATERIAL:
  A. STEEL, ALLOY, MIL-S-8559 COND C4
  B. STEEL, CARBON: QQ-S-647: 1117 OR 11L17 COLD FINISHED.

2 125 ALL MACHINED SURFACES.

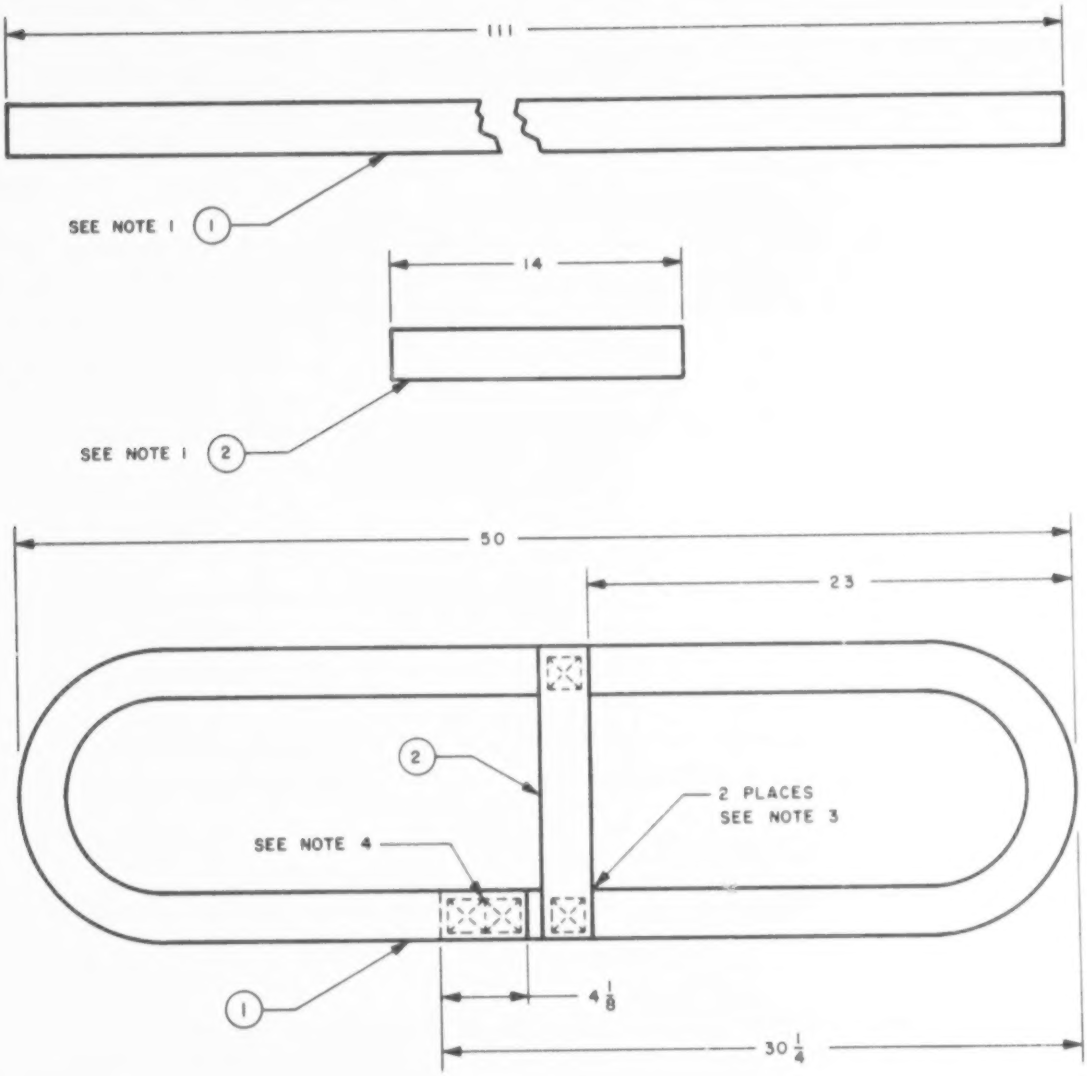
3 HEAT TREATMENT: MIL-H-6875, QUENCH AND TEMPER TO 48-51 ROCKWELL "C". HEAT TREATMENT MAY BE OMITTED; HOWEVER, TOOL LIFE WILL BE SIGNIFICANTLY REDUCED.

4 FINISH; 5.3.1.2 OR 5.3.2.2 OF MIL-STD-171.

5 MACHINED SLOT IN SHAFT AND ASSOCIATED SPRING PIN ARE CONVENIENCE ITEMS TO PREVENT SEPARATION AND SUBSEQUENT LOSS OF PARTS AND DO NOT AFFECT FUNCTION.

6 VIBRO ETCH PART NUMBER UMI 1001. CHARACTERS SHALL BE APPROXIMATELY 0.125 INCH HIGH.

Figure E-1. Bolt Head Lock Installation Tool


111
SEE NOTE 1 ①
14
SEE NOTE 1 ②
50
23
②
2 PLACES
SEE NOTE 3
SEE NOTE 4
①
4 1/8
30 1/4

NOTES:

1 MATERIAL NYLON WEBBING MIL-W-4088, TYPE B

2 ALL DIMENSIONS IN INCHES

3 DOUBLE STITCH USING NYLON THREAD

4 OVERLAP ENDS AND DOUBLE STITCH USING NYLON THREAD

Figure E-2. Gun Lifting Sling

APPENDIX F

TORQUE LIMITS

GENERAL

F-1. This appendix contains selected general information and methods for applying torque. Special torque values and sequences are indicated in the task relating to a specific part. For complete general information and instructions for applying torque, refer to TM 55-1500-204-25/1.

TORQUE DEFINITIONS

F-2. Definitions of breakaway torque, tare torque, and final torque are provided in the following paragraphs.

BREAKAWAY TORQUE

The torque necessary to begin turning a nut off a bolt with no axial load on the nut and with the bolt completely through the nut.

TARE TORQUE

The torque necessary to overcome the internal friction between a self-locking nut and bolt as the nut is being turned on the bolt but before the nut contacts the washer.

FINAL TORQUE

The sum of the tare torque (rundown resistance) and the standard torque.

TORQUE VALUES

F-3. There is a correct torque value for tightening every fastener. In some instances, torque value will be specified in the maintenance tasks. These special torque values take precedence over the recommended standard torque values contained in this appendix. In most instances, however, the torque values will be obtained from a listing of recommended standard torque values provided in paragraph F-4. This paragraph should be consulted for the correct torque value for any fastener that does not have a special torque value specified in the maintenance tasks.

TORQUE SPECIFICATIONS

F-4. General torque requirements and standard torque values are provided in the following paragraphs.

TORQUE REQUIREMENTS

1. Fasteners with less than 125,000 psi tensile strength (heat treat) do not require a mandatory torque value.

APPENDIX F - TORQUE LIMITS (cont)

2. Fasteners with more than 125,000 psi tensile strength (heat treat) will be torqued in accordance with the specified special or standard torque values.

3. Round or chamfered-end bolts must extend through nuts by at least the full round or chamfer plus one thread pitch beyond nut when torqued.

4. Flat-end bolts must extend at least two thread pitches beyond nut when torqued.

5. Self-locking fasteners must be checked for damaged threads and must permit tightening with fingers up to the locking element.

6. Torque values must be calculated when non-concentric attachments are used with torque wrenches.

STANDARD TORQUE VALUES

Recommended standard torque values are listed in the following tabulated data.

Fine Thread

Size	Plain and Castellated Steel Nuts Used with Bolts in Tension Loading				Thin Plain and Castellated Steel Nuts Used with Bolts in Shear Loading			
	Torque				Torque			
	(Lb-In.)		(N.m)		(Lb-In.)		(N.m)	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
8-36	12	15	1.4	1.7	7	9	0.8	1.0
10-32	20	25	2.3	2.8	12	15	1.4	1.7
1/4-28	50	70	5.7	7.9	30	40	3.4	4.5
5/16-24	100	140	11.3	15.8	60	85	6.8	9.6
3/8-24	160	190	18.1	21.5	95	110	10.7	12.4
7/16-20	450	500	50.9	56.5	270	300	30.5	33.9
1/2-20	480	690	54.2	78.0	290	410	32.8	46.3
9/16-18	800	1000	90.4	113	480	600	54.2	67.8
5/8-18	1100	1300	124.3	146.9	600	780	67.8	88.1
3/4-16	2300	2500	259.9	282.5	1300	1500	146.9	169.5
7/8-14	2500	3000	282.5	339.0	1500	1800	169.5	203.4
1-12	3700	5500	418.1	621.5	2200 (See Note)	3300	248.6 (See Note)	372.9
1-1/8-12	5000	7000	565.0	791.0	3000 (See Note)	4200	339.0 (See Note)	474.6
1-1/4-12	9000	11000	1017.0	1243.0	5400 (See Note)	6000	610.2 (See Note)	678.0
Coarse Thread								
8-32	12	15	1.4	1.7	7	9	0.8	1.0
10-24	20	25	2.3	2.8	12	15	1.4	1.7
1/4-20	40	50	4.5	5.7	25	30	2.8	3.4
5/16-18	80	90	9.0	10.2	50	55	5.7	6.2

Coarse Thread

Size	Plain and Castellated Steel Nuts Used with Bolts in Tension Loading				Thin Plain and Castellated Steel Nuts Used with Bolts in Shear Loading			
	Torque				Torque			
	(Lb-In.)		(N.m)		(Lb-In.)		(N.m)	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
3/8-16	160	185	18.1	20.9	95	100	10.7	11.3
7/16-14	235	255	26.6	28.8	140	155	15.8	17.5
1/2-13	400	480	45.2	54.2	240	290	27.1	32.8
9/16-12	500	700	56.5	79.1	300	420	33.9	47.5
5/8-11	700	900	79.1	101.7	420	540	47.5	61.0
3/4-10	1150	1600	130.0	180.8	700	950	79.1	107.4
7/8-9	2200	3000	248.6	339.0	1300	1800	146.9	203.4

NOTES:

1. Estimated corresponding values.
2. Torque values are derived from oil-free cadmium-plated threads.
3. Torque values are based on use of 125KS1 bolts.
4. Torque values are for turning nuts on stationary bolts.
5. Torque values may be used for all cadmium-plated steel nuts of the fine or coarse thread series which have approximately equal number of threads and equal face bearing areas.
6. Average torque values in shear loading are approximately 60 percent of average torque value in tension loading.
7. Torque values are applicable to self-locking nuts as well. The final torque of a self-locking nut is the sum of the tare torque (rundown resistance) plus the standard torque.
8. Divide torque values in pound-inches by 12 to convert torque values to pound-feet.
9. Multiply torque values in pound-inches by 0.113 to convert torque values to Newton-meters.
10. Multiply torque values in pound-feet by 1.356 to convert torque values to Newton-meters.

SELF-LOCKING NUT TORQUE

Do not use self-locking nuts if the tare torque (rundown resistance) is less than the minimum value listed in the following tabulated data. Make certain that a minimum of two threads of matching bolt are exposed past locking element of nut when checking tare torque. The final torque of a self-locking nut is the sum of the standard torque plus the tare torque.

best copy available

APPENDIX F - TORQUE LIMITS (cont)

Fine Thread

Size	Minimum Tare Torque (Lb-In.)	Minimum Tare Torque (N.m)
10-32	(See Note)	(See Note)
1/4-28	(See Note)	(See Note)
5/16-24	6.5	0.7
3/8-24	9.5	1.1
7/16-20	14.0	1.6
1/2-20	18.0	2.0
9/16-18	24.0	2.7
5/8-18	32.0	3.6
3/4-16	50.0	5.7
7/8-14	70.0	7.9
1-12	90.0	10.2
1-1/8-12	117.0	13.2
1-1/4-12	143.0	16.2
1-3/8-12	180.0	20.3
1-1/2-12	210.0	23.7
Coarse Thread		
4-40	(See Note)	(See Note)
6-32	(See Note)	(See Note)
8-32	(See Note)	(See Note)
10-24	(See Note)	(See Note)
1/4-20	(See Note)	(See Note)
5/16-18	7.5	0.9
3/8-16	12.0	1.4
7/16-14	16.5	1.9
1/2-13	24.0	2.7
9/16-12	30.0	3.4
5/8-11	40.0	4.5
3/4-10	60.0	6.8
7/8-9	82.0	9.3
1-8	110.0	12.4
1-1/8-7	137.0	15.5
1-1/4-7	165.0	18.7
1-3/8-6	200.0	22.6
1-1/2-6	230.0	26.0
1-3/4-5	300.0	34.0

NOTE:

Check tare torque by attempting to thread self-locking nut onto matching bolt. Reuse only those self-locking nuts that cannot be tightened down with fingers after locking element engages threads of matching bolt. Discard self-locking nuts that do not meet this requirement.

SELECTING A TORQUE WRENCH

F-5. Indicating dial and audible indicating type torque wrenches are usually selected in preference to the flexible beam-type torque wrench. The audible indicating torque is generally recommended because it can be used in applications where it would be difficult to read a dial or scale. Additional criteria to be considered when selecting a torque wrench are as follows:

ACCURACY

The accuracy of most torque wrenches tends to decrease at the extremes of the torque range. The torque value being applied should be between the 30 and 80 percent points of the torque wrench range.

GRADUATION INCREMENTS

The graduation increments of the torque wrench should not be greater than 10 percent of the torque value being applied.

CALIBRATION UNITS

The torque wrench should be calibrated in the same units as the specified torque for the fastener. However, if the torque wrench is not calibrated in the desired units, the units may be converted.

TORQUE APPLICATION

F-6. The information provided in the following paragraphs should be carefully considered before applying torque to any fastener.

THREAD CONDITION

Threads must be clean and free from nicks, burrs, paint, grease, or oil to obtain the correct torque when it is tightened to the specified torque value. In applications where lubrication or anti-seize compound is used on threads, special torque values will be specified.

CHECKING APPLIED TORQUE

The torque of an installed fastener cannot be checked. Back off fastener one-half to one turn and retighten it to the specified torque.

TIGHTENING NEW FASTENERS

Tighten fastener to desired torque. Back off fastener one-half to one turn. Retighten fastener to desired torque. This practice aids in cleaning and smoothing the threads and results in more accurately applied torque.

TIGHTENING SELF-LOCKING NUTS

Self-locking nuts contain an internal locking element. The tare torque (rundown resistance) of this locking element must be measured as the nut is being turned but before the nut touches the washer. The final torque is the sum of the tare torque plus the standard torque.

APPENDIX F - TORQUE LIMITS (cont)

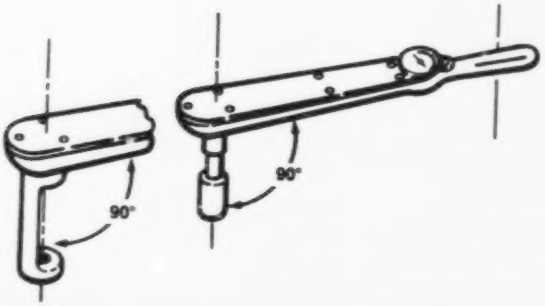
TIGHTENING A FASTENER ON THE HEAD END

Apply torque to a bolt head only when torque cannot be applied to the nut. When a fastener is tightened from the head end, some of the torque applied is absorbed in turning the bolt in the hole. Since the amount of torque that is absorbed will vary, the torque values specified are for tightening fasteners on the nut end. When fasteners must be tightened from the head end, torque them as follows:

1. If the fastener can be inserted through the hole and started into the nut by the fingers, use the recommended standard torque.
2. If the fastener is inserted in a hole that increases the tightening resistance, record the amount of resistance as tare torque. Add the tare torque to the recommended standard torque and tighten the fastener to this value.
3. If the fastener is installed in a threaded hole with hole thread length more than diameter of fastener, use the recommended standard torque value. If the fastener is installed in a threaded hole with hole thread length less than diameter of fastener, use a reduced torque value from the value stated.

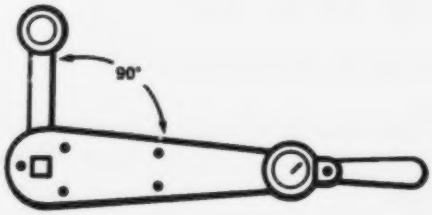
USING A CONCENTRIC ATTACHMENT ON A TORQUE WRENCH

The use of an attachment which operates concentrical with the torque wrench drive square as shown below does not present a problem. The torque value applied is the torque value indicated.



CONCENTRIC TORQUE WRENCH ATTACHMENTS

ARR82-26828

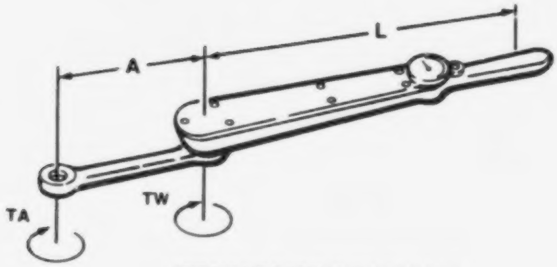


RIGHT ANGLE OFFSET CONCENTRIC
TORQUE WRENCH ATTACHMENT

ARR82-26829

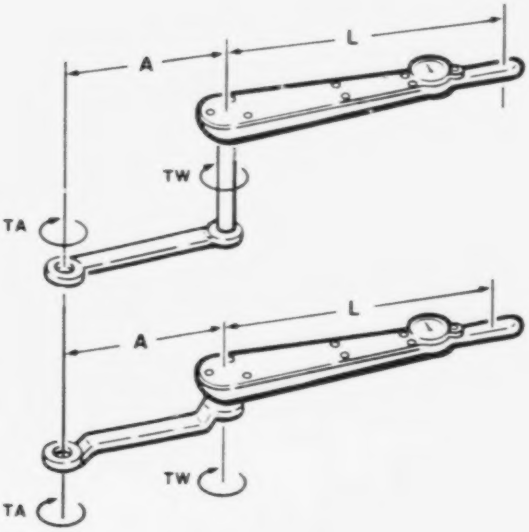
USING A NONCONCENTRIC ATTACHMENT ON A TORQUE WRENCH

The use of a nonconcentric attachment which does not operate concentrically with the torque wrench drive square as shown below presents a problem. This type of attachment affects the lever length and the torque value applied is not the torque value indicated.



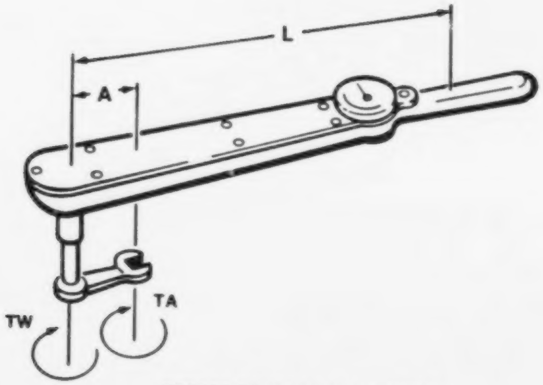
STRAIGHT EXTENSION TORQUE WRENCH ATTACHMENT

ARR82 26830



OFFSET EXTENSION TORQUE WRENCH ATTACHMENTS

ARR82 26831



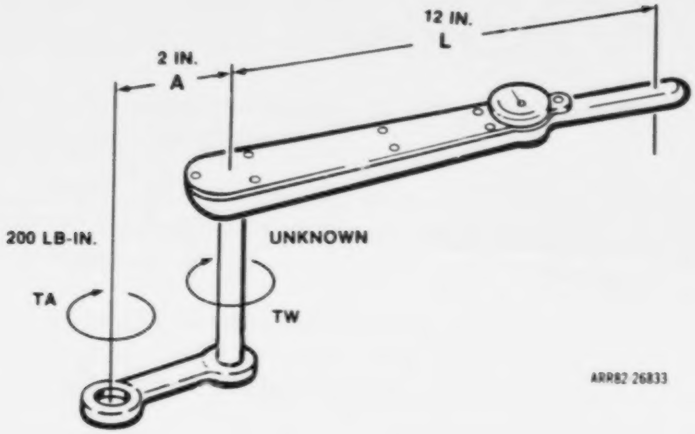
OFFSET REVERSE EXTENSION TORQUE WRENCH ATTACHMENT

ARR82 26832

The correct indicated torque value for nonconcentric attachments is determined by calculating the effect of the lever arm as shown in examples 1 through 3.

APPENDIX F · TORQUE LIMITS (cont)

EXAMPLE 1


12 IN.
L
2 IN.
A
200 LB-IN.
UNKNOWN
TA
TW
ARR82 26833

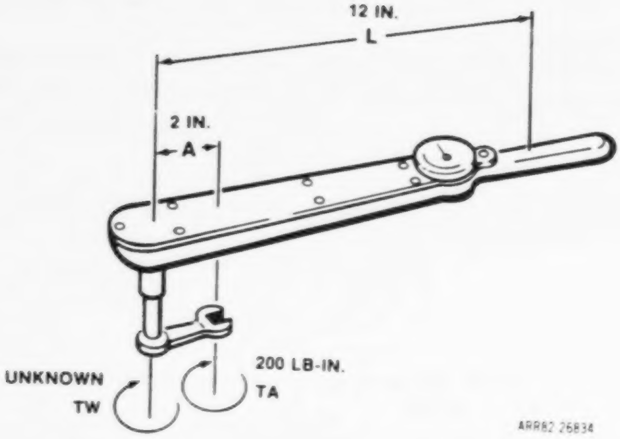
TW = Indicated torque value on torque wrench
TA = Actual torque value applied to fastener
L = Lever length
A = Attachment length

$$TW = \frac{TA \times L}{L + A}$$

$$TW = \frac{200 \times 12}{12 + 2} = \frac{2400}{14} = 171.4 \text{ Lb-In.}$$

FASTENER IS TORQUED TO 200 LB-IN. WHEN TORQUE WRENCH INDICATES 171.4 LB-IN.

EXAMPLE 2


12 IN.
L
2 IN.
A
UNKNOWN
TW
200 LB-IN.
TA
ARR82 26834

TW = Indicated torque value on torque wrench
TA = Actual torque value applied to fastener
L = Lever length
A = Attachment length

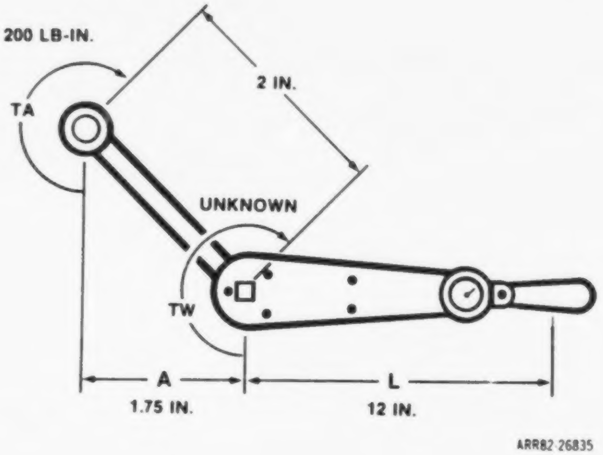
$$TW = \frac{TA \times L}{L - A}$$

$$TW = \frac{200 \times 12}{12 - 2} = \frac{2400}{10} = 240 \text{ Lb-In.}$$

FASTENER IS TORQUED TO 200 LB-IN. WHEN TORQUE WRENCH INDICATES 240 LB-IN.

APPENDIX F - TORQUE LIMITS (cont)

EXAMPLE 3


200 LB-IN.
2 IN.
TA
UNKNOWN
TW
A
1.75 IN.
L
12 IN.
ARR82-26835

TW = Indicated torque value on torque wrench
TA = Actual torque value applied to fastener
L = Lever length
A = Attachment length

$$TW = \frac{TA \times L}{L + A}$$

$$TW = \frac{200 \times 12}{12 + 1.75} = \frac{2400}{13.75} = 174.5 \text{ Lb-In.}$$

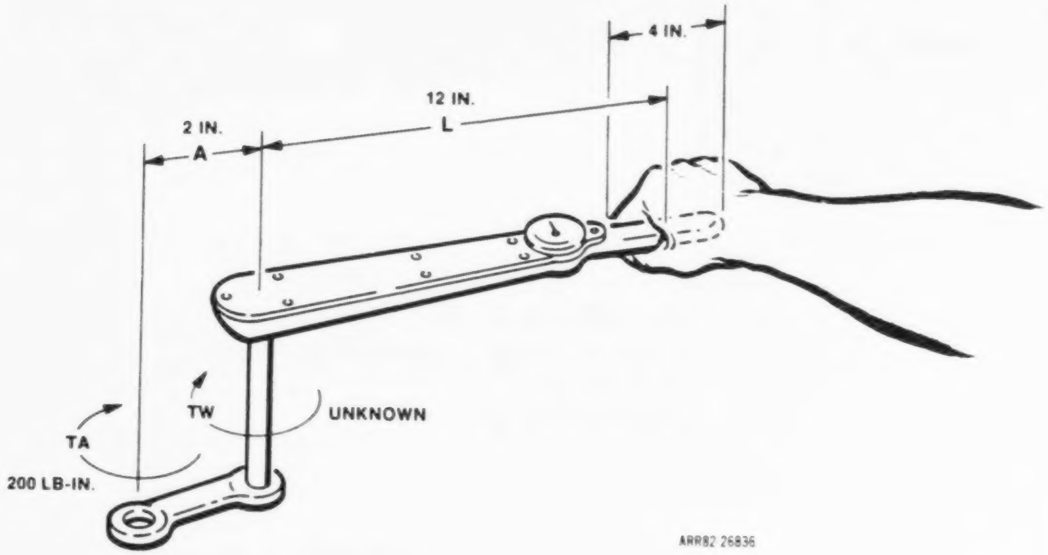
FASTENER IS TORQUED TO 200 LB-IN. WHEN TORQUE WRENCH INDICATES 174.5 LB-IN.

The point of force on the torque wrench must also be considered as follows:

1. The point of force applied on a flexible beam-type torque wrench pivoted grip will not affect the calculated torque applied to the fastener.

2. The point of force applied on rigid frame and audible indicating torque wrench grips will affect the calculated torque applied to the fastener. The effects of proper and improper application of force is shown in examples 4 through 6.

EXAMPLE 4 — PROPER APPLICATION OF FORCE



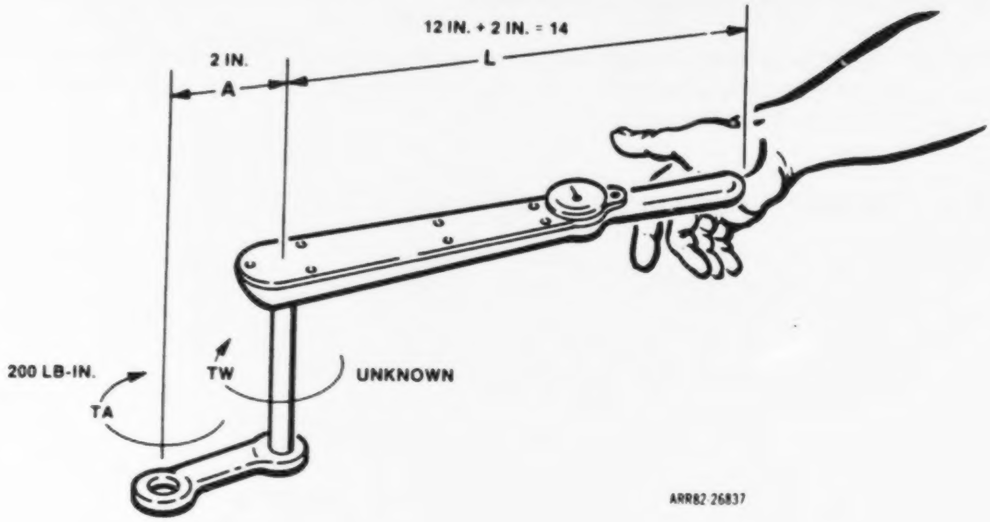
TW = Indicated torque value on torque wrench
TA = Actual torque value applied to fastener
L = Lever length
A = Attachment length

$$TW = \frac{TA \times L}{L + A} \quad \frac{200 \times 12}{12 + 2} = \frac{2400}{14} = 171.4 \text{ Lb-In.}$$

FASTENER IS TORQUED TO 200 LB-IN. WHEN TORQUE WRENCH INDICATES 171.4 LB-IN.

APPENDIX F · TORQUE LIMITS (cont)

EXAMPLE 5 — IMPROPER APPLICATION OF FORCE


12 IN. + 2 IN. = 14
2 IN.
L
A
200 LB-IN.
TA
TW
UNKNOWN
ARR82-26837

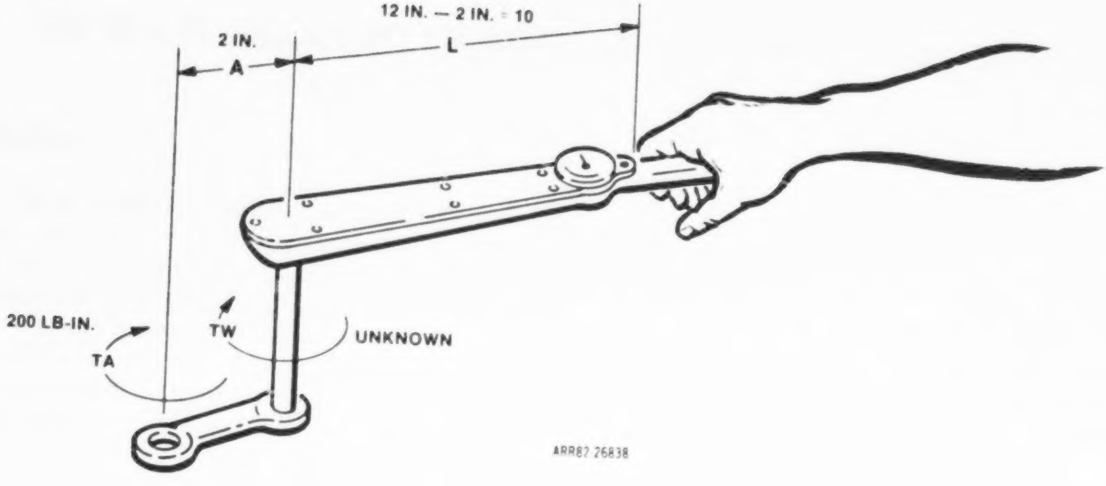
TW = Indicated torque value on torque wrench
TA = Actual torque value applied to fastener
L = Lever length
A = Attachment length

$$TW = \frac{TA \times L}{L + A}$$

$$TW = \frac{200 \times (12 + 2)}{(12 + 2) + 2} = \frac{2800}{16} = 175 \text{ Lb-In.}$$

FASTENER IS TORQUED TO 200 LB-IN. WHEN TORQUE WRENCH INDICATES 174.5 LB-IN.

EXAMPLE 6


12 IN. — 2 IN. = 10
2 IN.
A
L
200 LB-IN.
TA
TW
UNKNOWN
ARR82 26838

TW = Indicated torque value on torque wrench
TA = Actual torque value applied to fastener
L = Lever length
A = Attachment length

$$TW = \frac{TA \times L}{L + A}$$

$$TW = \frac{200 \times (12 - 2)}{(12 - 2) + 2} = \frac{2000}{12} = 166.6 \text{ Lb-In.}$$

FASTENER IS TORQUED TO 200 LB-IN. WHEN TORQUE WRENCH INDICATES 166.6 LB-IN.

APPENDIX G

150 HOUR HELICOPTER ARMAMENT SUBSYSTEM CHECK

GENERAL

G-1. This appendix provides a phase-related check which operationally tests all the armament subsystems which comprise the Helicopter Armament Subsystem. When the subsystems provide normal indications throughout this check, performance of the Helicopter Armament Subsystem is verified. This task may be used as an aid in troubleshooting to determine malfunctions in subsystems not directly covered in this manual. If abnormal indications occur, it may become necessary to consult the applicable system technical manual for further test/troubleshooting instructions, or refer to the troubleshooting instructions contained in TM 55-1520-236-T. This task is intended to be performed with the unit's designated aircraft armament technical inspector present.

G-2. 150 HOUR ARMAMENT SUBSYSTEM CHECK

DESCRIPTION

This task covers: Checkout of armament subsystem after completion of helicopter 150 hour phase maintenance.

INITIAL SETUP

Tools/Test and Support Equipment:
  Tool Set, A/C Armament
    Repairman: Basic
  Tool Set, A/C Armament
    Repairman: Supplemental
  Rocket Present Simulators
(local manufacture per TM 55-1520-236-T)
  Firing Simulator Assembly (P/O Electronics
    Systems Test Set: M137)

References:
  TM 9-1425-473-34, TM 55-1520-236-23,
    TM 55-1520-236-T

Personnel Required: (3)
  68J Aircraft Fire Control Repairer/
  68M Aircraft Weapon Systems Repairer

Equipment Conditions:
  TSGMS test completed, see
    TM 9-1425-473-34.
  Jettison circuitry test completed,
    see TM 55-1520-236-23.
  Helicopter phase maintenance
    completed, see TM 55-1520-236-23.
  Nose fairings from left-hand
    and right-hand inboard/out-
    board wing pylons removed.
    Connectors 21A6P1 and 21A7P1,
    21A8P1, and 21A9P1 disconnected,
    see TM 55-1520-236-23.
  Power applied, see ELECTRICAL
    POWER APPLICATION/
    REMOVAL, para 2-7.
  TSU window cover removed.

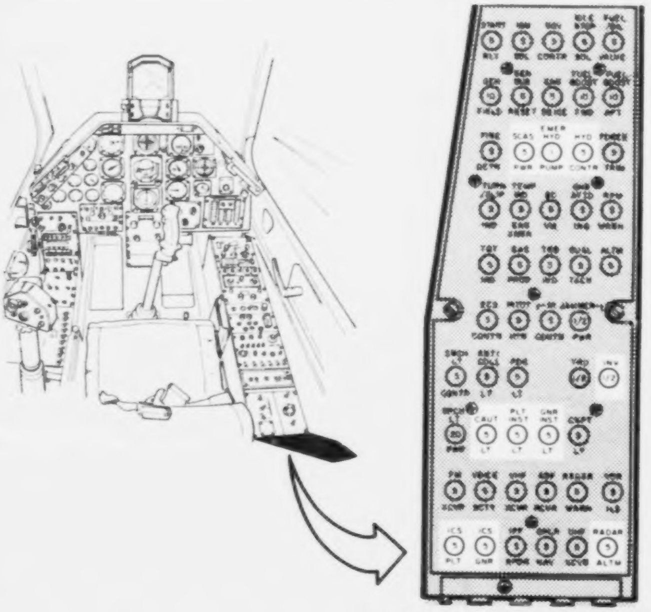
150 HOUR CHECK SETUP

NOTE

ICS PLT and ICS GNR circuit breakers may be closed to provide internal communications.

1. CLOSE FOLLOWING CIRCUIT BREAKERS ON DC CIRCUIT BREAKER PANEL:

   SCAS PWR
   EMER HYD PUMP
   HYD CONTR
   INV
   CAUT LT
   PLT INST LT
   GNR INST LT
   ICS PLT
   ICS GNR
   RADAR ALTM



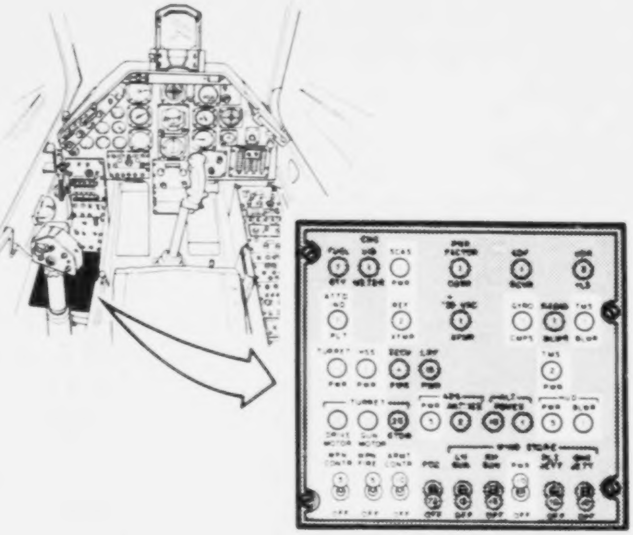
DC CIRCUIT BREAKER PANEL

ARR82-28049 A

150 HOUR CHECK SETUP (cont)

2. CLOSE FOLLOWING CIRCUIT BREAKERS ON AC/ARMAMENT CIRCUIT BREAKER PANEL:

   SCAS PWR
   REF XFMR
   GYRO CMPS
   TMS BLWR
   TURRET PWR
   HSS PWR
   TMS PWR
   TURRET DRIVE MOTOR
   TURRET GUN MOTOR
   ADS PWR
   HUD PWR
   HUD BLWR
   WPN CONTR
   WPN FIRE
   ARMT CONTR
   WING STORE PWR
   ATTD IND PLT

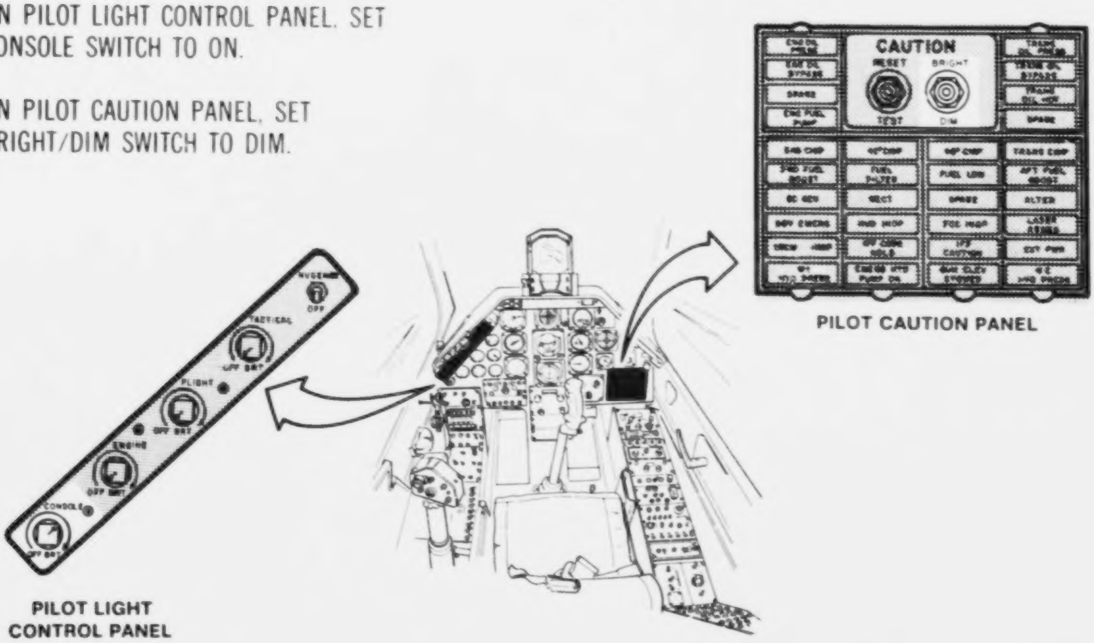

SCAS
PWR
ATTD IND PLT
REF XFMR
GYRO CMPS
TMS BLWR
TURRET
HSS
TMS
DRIVE MOTOR
GUN MOTOR
WPN CONTR
WPN FIRE
ARMT CONTR
WING STORE
HUD
BLWR
OFF

AC / ARMAMENT CIRCUIT BREAKER PANEL

ARR82 28050

3. ON PILOT LIGHT CONTROL PANEL, SET CONSOLE SWITCH TO ON.

4. ON PILOT CAUTION PANEL, SET BRIGHT/DIM SWITCH TO DIM.


CAUTION
RESET
BRIGHT
TEST
DIM
NVG
TACTICAL
FLIGHT
ENGINE
CONSOLE
OFF BRT
OFF

PILOT CAUTION PANEL

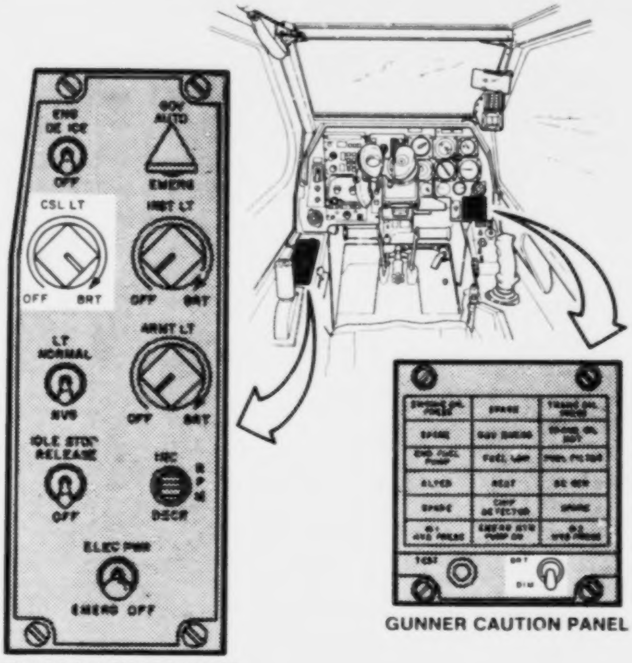
PILOT LIGHT CONTROL PANEL

ARR82 28051

APPENDIX G - 150 HOUR ARMAMENT SUBSYSTEM CHECK (cont)

5. SET CSL LT SWITCH ON GUNNER MISCELLANEOUS CONTROL PANEL TO ON.

6. ON GUNNER CAUTION PANEL, SET BRT/DIM SWITCH TO DIM.


ENG DE ICE
OFF
GOV AUTO
EMERG
CSL LT
OFF
BRT
INST LT
OFF
BRT
LT NORMAL
NVS
ARMT LT
OFF
BRT
IDLE STOP RELEASE
OFF
ISC
RPM
DECR
ELEC PWR
EMERG OFF
TEST
BRT
DIM

GUNNER CAUTION PANEL

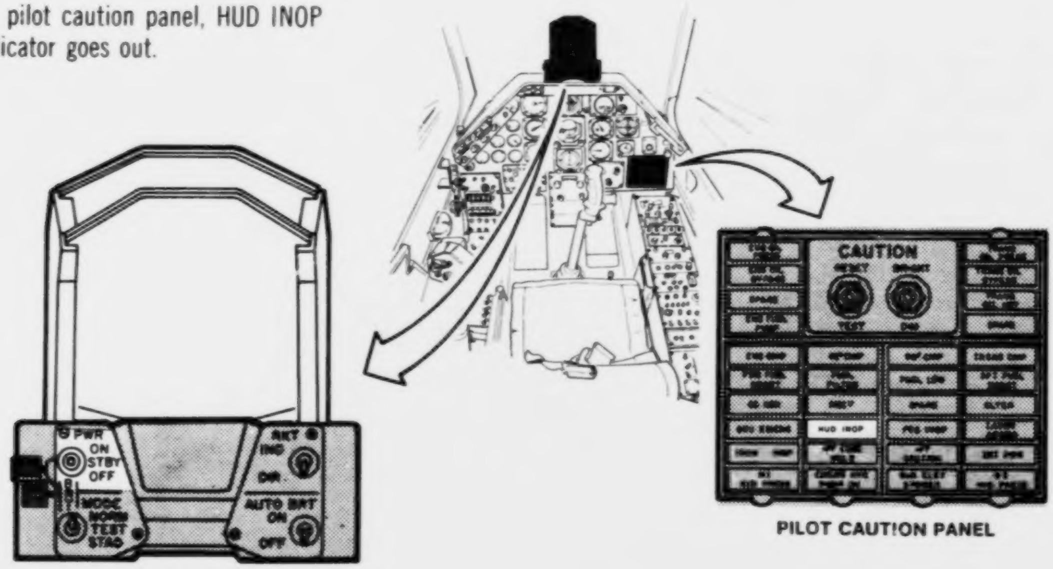
GUNNER MISCELLANEOUS CONTROL PANEL

ARR82-28052

150 HOUR CHECK

7. ON HUD, SET POWER SWITCH TO STBY.

   On pilot caution panel, HUD INOP indicator goes out.


PWR
ON
STBY
OFF
MODE
NORM
TEST
STAO
BRT
INC
DIM
AUTO BRT
ON
OFF
CAUTION
RESET
BRIGHT
TEST
DIM
HUD INOP

PILOT CAUTION PANEL

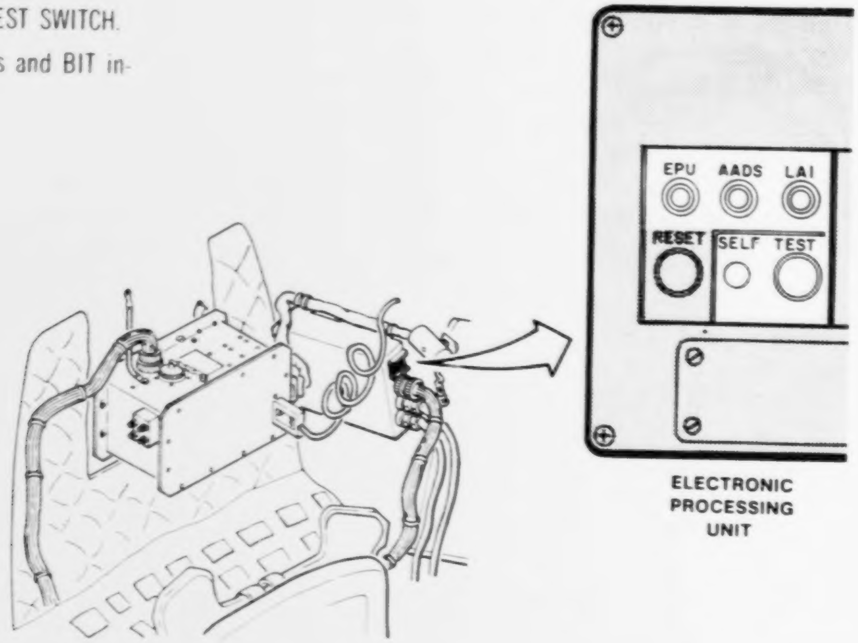
HEAD UP DISPLAY

ARR82-28053

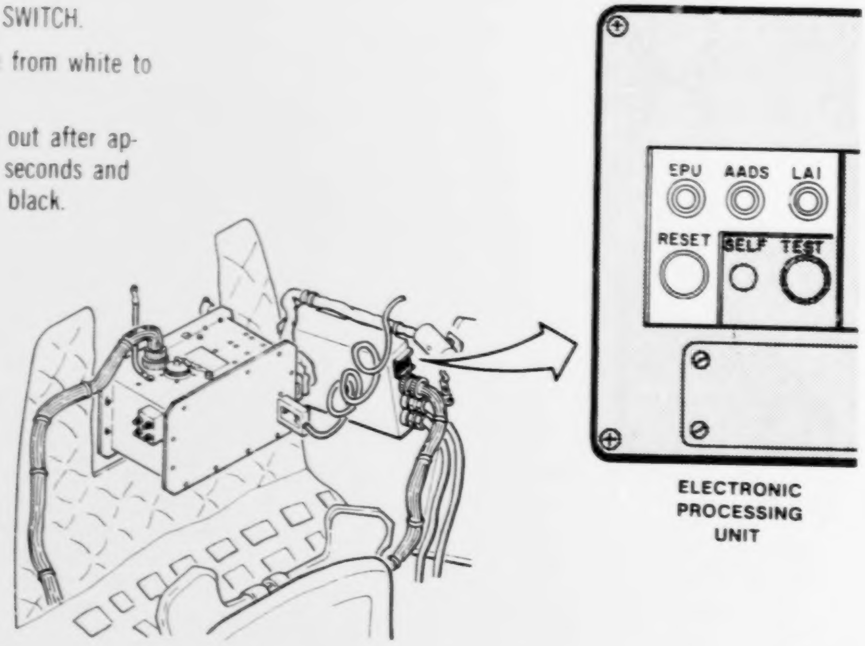
150 HOUR CHECK (cont)

8. ON EPU, PRESS SELF TEST SWITCH.

   SELF TEST lamp lights and BIT indicators show white.


EPU
AADS
LAI
RESET
SELF TEST
ELECTRONIC PROCESSING UNIT
ARR82-28054

9. ON EPU, PRESS RESET SWITCH.
   a. BIT indicators change from white to black.
   b. SELF TEST lamp goes out after approximately 10 to 20 seconds and BIT indicators remain black.


EPU
AADS
LAI
RESET
SELF TEST
ELECTRONIC PROCESSING UNIT
ARR82-28055

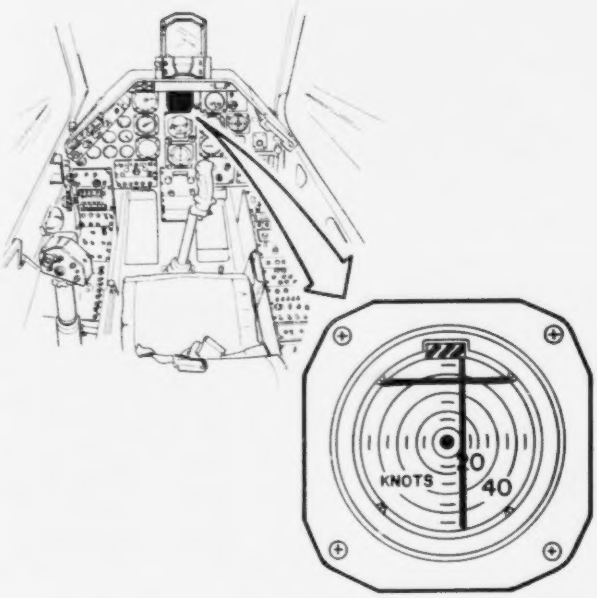
APPENDIX G - 150 HOUR ARMAMENT SUBSYSTEM CHECK (cont)

150 HOUR CHECK (cont)

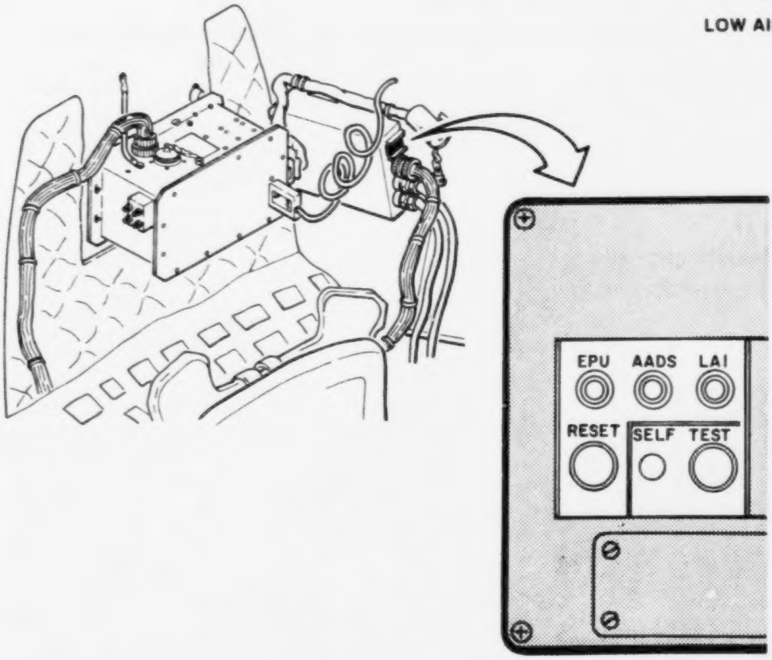
10. ON LAI, NOTE POSITION OF LAI BARS.
11. ON EPU, PRESS TEST SWITCH.

    SELF TEST lamp lights and BIT indicators show white.

12. ON EPU, PRESS RESET SWITCH.
    - a. LAI bars show 40 knots forward and 10 knots right.
    - b. LAI status flag shows red and black.
13. AFTER APPROXIMATELY 10 TO 20 SECONDS, LAI BARS RETURN TO POSITION NOTED IN STEP 10 AND STATUS FLAG SHOWS BLACK.



LOW AIRSPEED INDICATOR



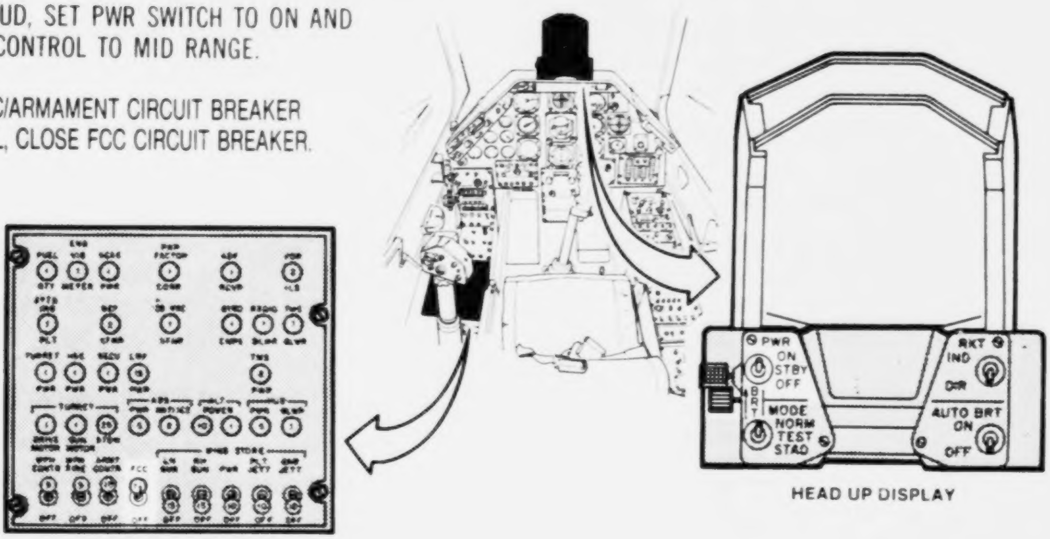
ELECTRONIC PROCESSING UNIT

ARR82-28056

150 HOUR CHECK (cont)

14. ON HUD, SET PWR SWITCH TO ON AND BRT CONTROL TO MID RANGE.

15. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, CLOSE FCC CIRCUIT BREAKER.


PWR
ON
STBY
OFF
BRT
MODE
NORM
TEST
STAD
RKT IND
DIR
AUTO BRT
ON
OFF
FCC

HEAD UP DISPLAY

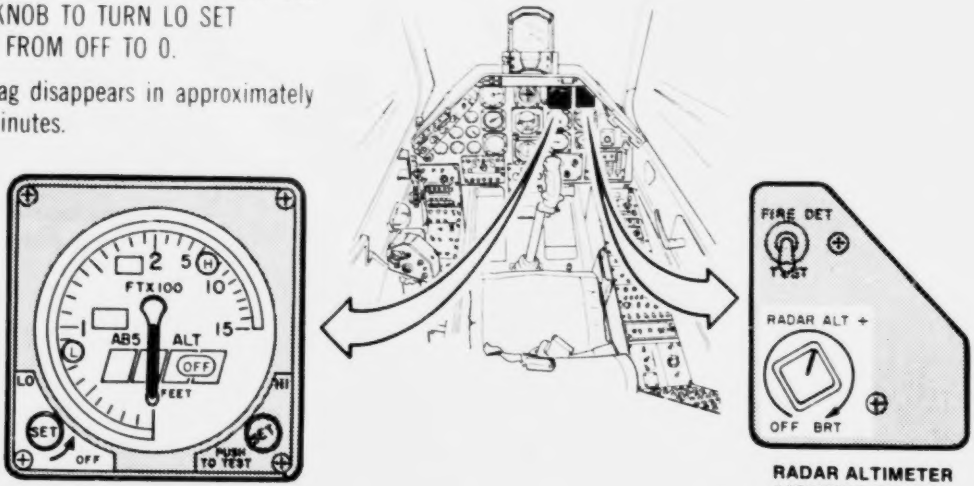
AC / ARMAMENT CIRCUIT BREAKER PANEL

ARR82 28057

16. ON RADAR ALTIMETER LIGHTING PANEL, SET RADAR ALT SWITCH TO BRT.

17. ON RADAR ALTIMETER INDICATOR, USE LO SET KNOB TO TURN LO SET MARKER FROM OFF TO 0.

    OFF flag disappears in approximately two minutes.


2
5
H
FTX100
10
1
15
L
ABS
ALT
OFF
FEET
LO
HI
SET
OFF
PUSH TO TEST
SET
FIRE DET
TEST
RADAR ALT +
OFF
BRT

RADAR ALTIMETER

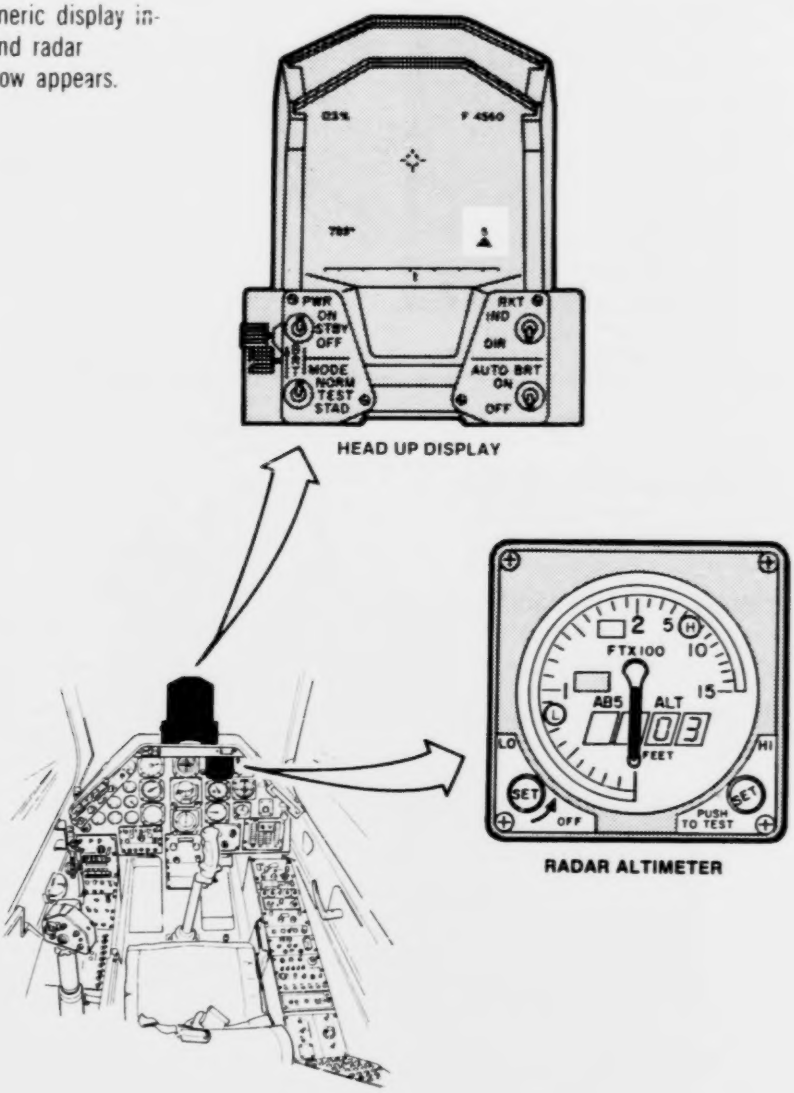
RADAR ALTIMETER LIGHTING SWITCH

ARR82 28058

APPENDIX G - 150 HOUR ARMAMENT SUBSYSTEM CHECK (cont)

150 HOUR CHECK (cont)

18. ON RADAR ALTIMETER INDICATOR, SET LO SET MARKER TO 80 FEET AND HI SET MARKER TO 800 FEET.
    a. Pointer indicates 0 to five feet, digital display indicates 0 to 3, and LO limit warning lamp lights.
    b. On HUD, altitude numeric display indicates 0 or 5 feet and radar altimeter LO limit arrow appears.



023%
F 4560
785°
5
PWR
ON
STBY
OFF
BRT
MODE
NORM
TEST
STAD
RKT
IND
DIR
AUTO BRT
ON
OFF
HEAD UP DISPLAY
2
5
H
FTX100
10
1
15
ABS
ALT
L
03
FEET
LO
HI
SET
OFF
SET
PUSH TO TEST
RADAR ALTIMETER

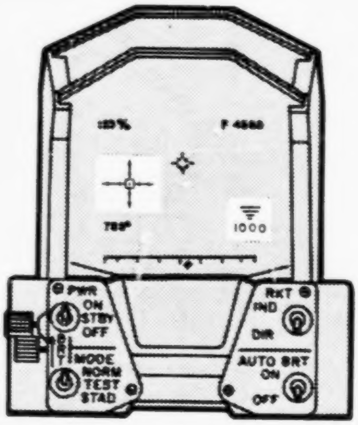
ARR82-28059

150 HOUR CHECK (cont)

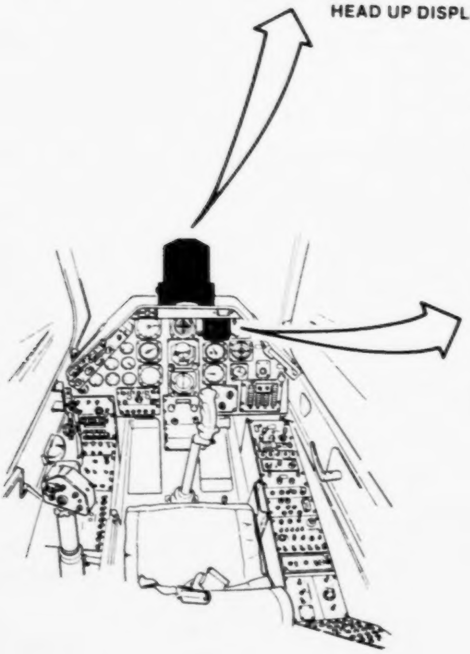
19. ON RADAR ALTIMETER INDICATOR, PRESS AND HOLD PUSH TO TEST BUTTON.
    a. Pointer moves to 825 to 1175 feet, LO limit warning lamp goes out, and HI limit lamp lights.
    b. On HUD, LO limit arrow goes out, HI limit arrow appears, numeric display indicates 900 to 1100 feet, and direct rocket reticle moves.

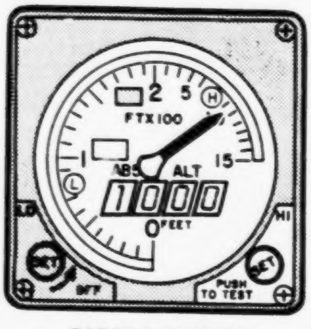
20. RELEASE PUSH TO TEST BUTTON.

    HUD and altimeter indications return to conditions in previous step.


1000
PWR
ON
STBY
OFF
MODE
NORM
TEST
STAD
RKT
IND
DIR
AUTO BRT
ON
OFF

HEAD UP DISPLAY




2
5
FT X 100
1
15
ABS ALT
1000
0 FEET
LO
HI
SET
OFF
PUSH TO TEST

RADAR ALTIMETER

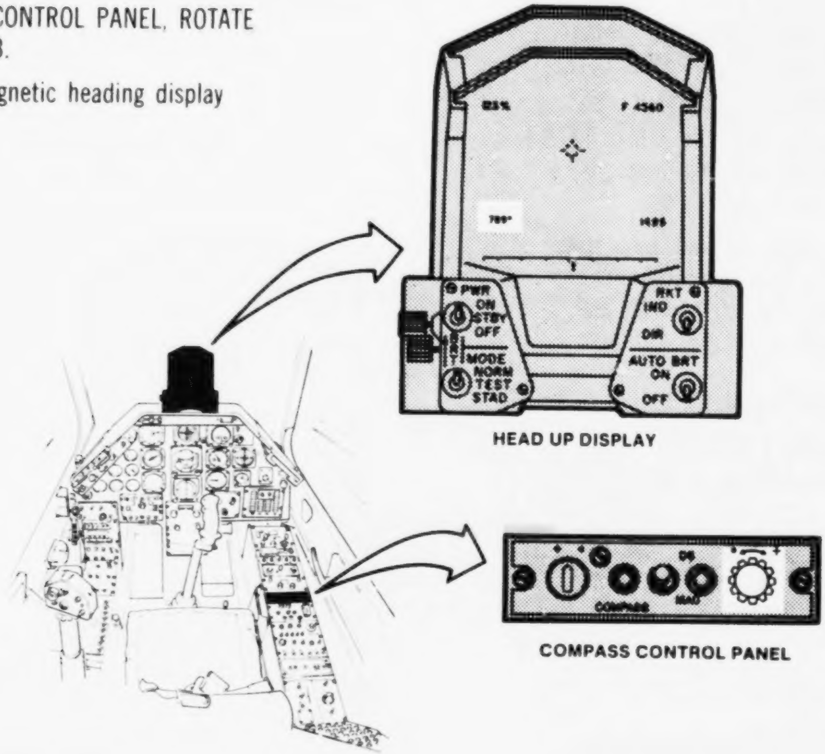
ARR82-28060

APPENDIX G - 150 HOUR ARMAMENT SUBSYSTEM CHECK (cont)

150 HOUR CHECK (cont)

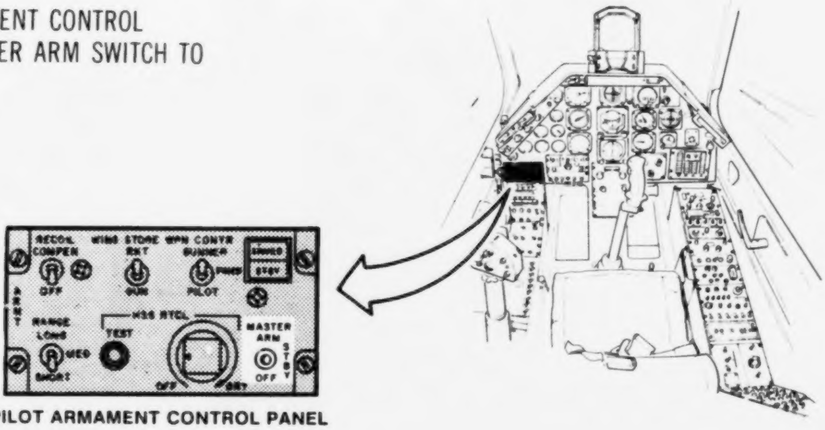
21. ON COMPASS CONTROL PANEL, ROTATE CONTROL KNOB.

    On HUD, magnetic heading display changes.


PWR
ON
STBY
OFF
BRT
MODE
NORM
TEST
STAD
RKT
IND
DIR
AUTO BRT
ON
OFF
HEAD UP DISPLAY
COMPASS
COMPASS CONTROL PANEL

ARR82-28061

22. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO STBY.


RECOIL
COMPEN
OFF
STORE
RKT
GUN
WPN CONTR
PILOT
STBY
ARMT
RANGE
LONG
MED
SHORT
TEST
OFF
MASTER
ARM
STBY
OFF

PILOT ARMAMENT CONTROL PANEL

ARR82-28062

150 HOUR CHECK (cont)

CAUTION

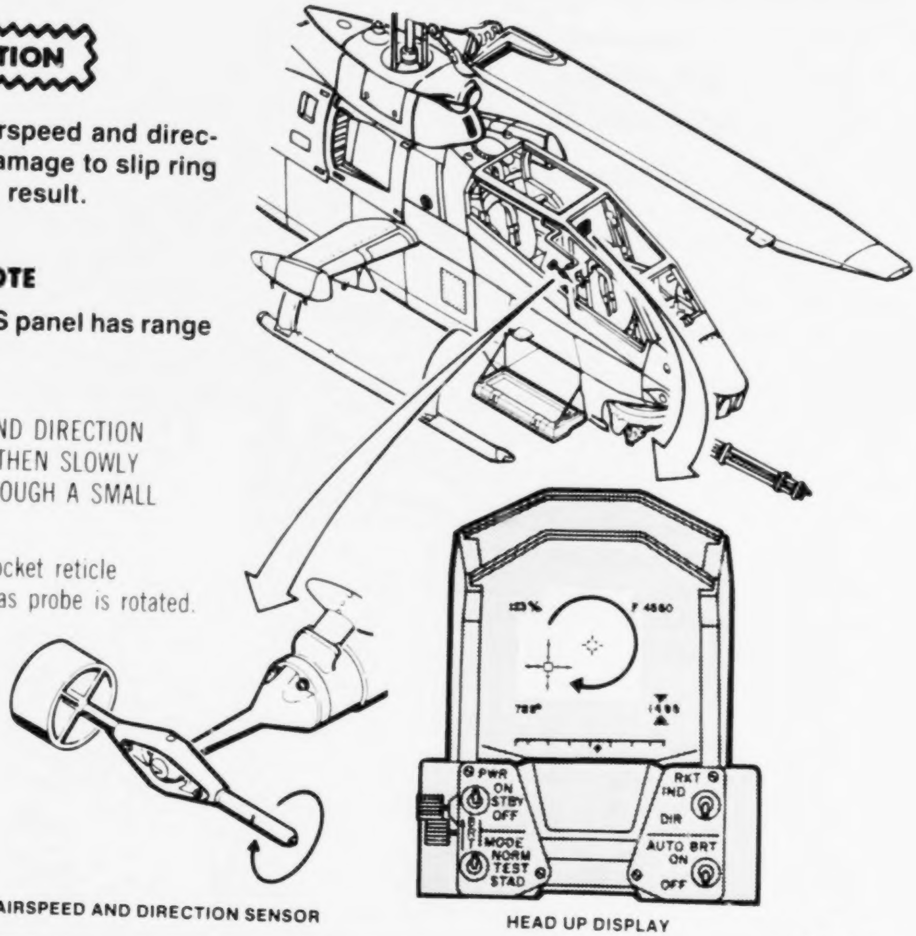
Do not spin airspeed and direction sensor, damage to slip ring assembly may result.

NOTE

Check that RMS panel has range input.

23. POINT AIRSPEED AND DIRECTION SENSOR FORWARD THEN SLOWLY ROTATE PROBE THROUGH A SMALL CIRCLE.

    On HUD, direct rocket reticle changes position as probe is rotated.


133 %
F 4560
758
1455
PWR
ON
STBY
OFF
BRT
MODE
NORM
TEST
STAD
RKT
IND
DIR
AUTO BRT
ON
OFF

AIRSPEED AND DIRECTION SENSOR

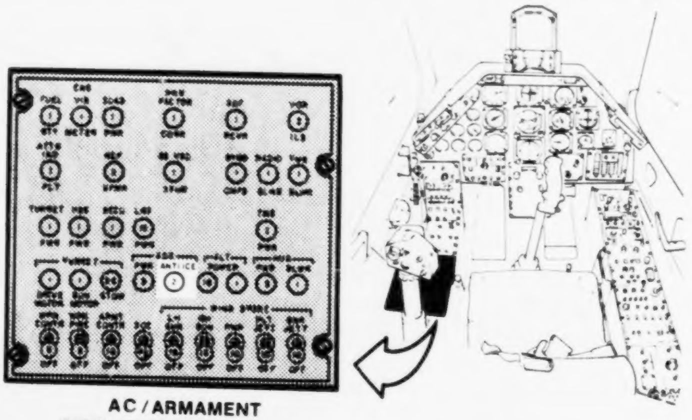
HEAD UP DISPLAY

ARR82-28063

WARNING

Do not touch airspeed and direction sensor probe when ADS ANTI ICE circuit breaker is closed. Probe can become very hot.

24. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, CLOSE ADS ANTI ICE CIRCUIT BREAKER.


FUEL
ILS
TURRET
ANTI ICE

AC / ARMAMENT CIRCUIT BREAKER PANEL

ARR82-28064

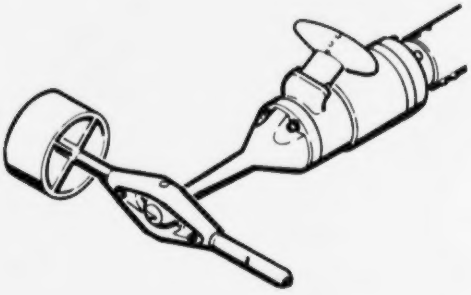
APPENDIX G - 150 HOUR ARMAMENT SUBSYSTEM CHECK (cont)

150 HOUR CHECK (cont)

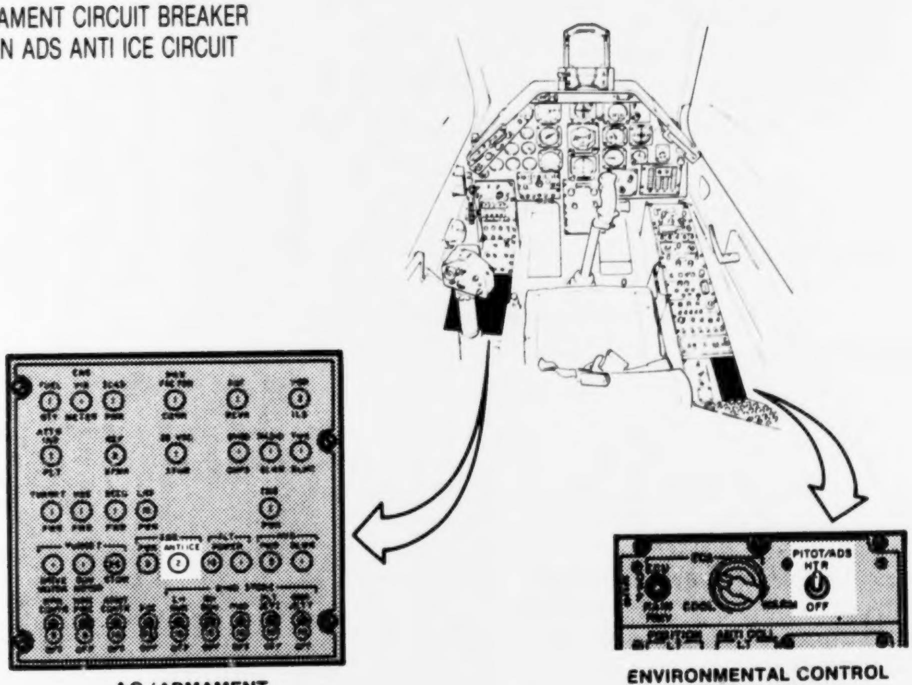
WARNING

Do not touch airspeed and direction sensor probe. Probe will become very hot.

25. CHECK AIRSPEED AND DIRECTION SENSOR PROBE HEATER ELEMENT.
    a. On environmental control system panel, set PITOT/ADS HTR switch to ON.
    b. Place hand near head of probe.
    c. When probe feels warm, turn PITOT/ADS switch to OFF.
26. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, OPEN ADS ANTI ICE CIRCUIT BREAKER.



AIRSPEED AND DIRECTION SENSOR



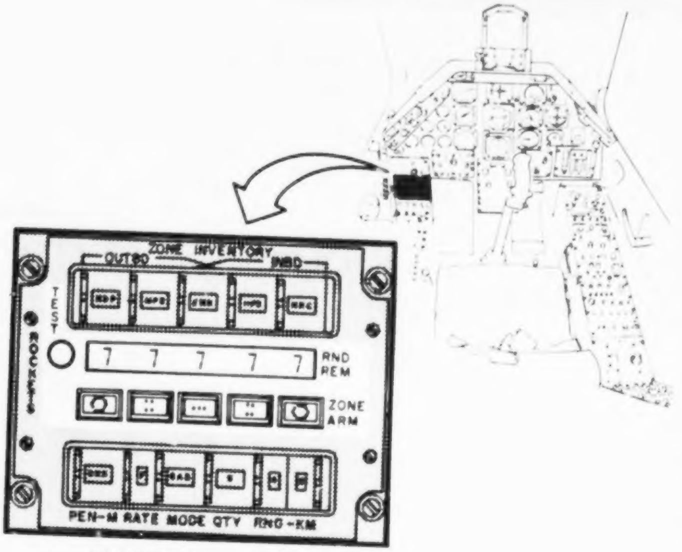
AC / ARMAMENT CIRCUIT BREAKER PANEL

ENVIRONMENTAL CONTROL SYSTEM PANEL

ARR82-28065

150 HOUR CHECK (cont)

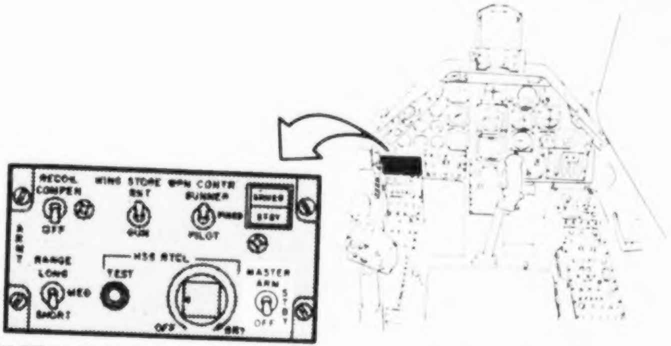
27. ON ROCKETS DISPLAY UNIT, PRESS TEST SWITCH.
    a. RND REM will momentarily display all eights and ZONE ARM indicators light.
    b. Seven appears in zone five, indicating display unit is functional. Sevens appear in zones two and four, indicating inboard operational units are functional. Sevens appear in zones one and three, indicating outboard operation units are functional.
    c. Sevens disappear and RND REM indicates zeroes.


ZONE INVENTORY
OUTBD
INBD
TEST
ROCKETS
7 7 7 7 7
RND REM
ZONE ARM
PEN-M RATE MODE QTY RNG-KM

ROCKET MANAGEMENT SUBSYSTEM DISPLAY

ARR82 28066

28. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO OFF.

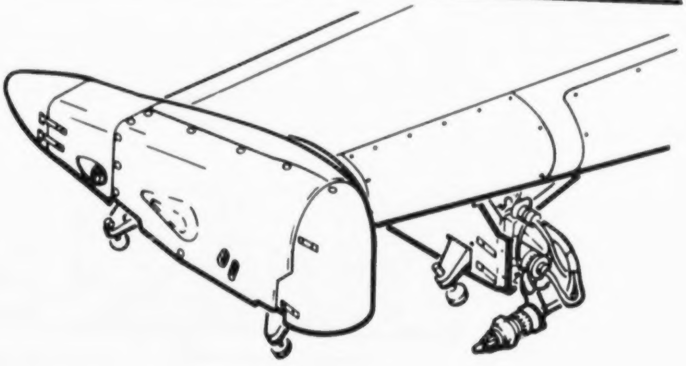

RECOIL COMPEN
OFF
WING STORE RST
GUN
WPN CONTR GUNNER
PILOT
FIXED
ARMED
STBY
ARMT
RANGE LONG
MED
SHORT
HSS RTCL
TEST
OFF
BRT
MASTER ARM
STBY
OFF

PILOT ARMAMENT CONTROL PANEL

ARR82 28067

NOTE

If four operations units are installed, install rocket present simulators to left and right outboard pylons.



29. INSTALL ROCKET PRESENT SIMULATORS TO LEFT AND RIGHT INBOARD PYLONS.

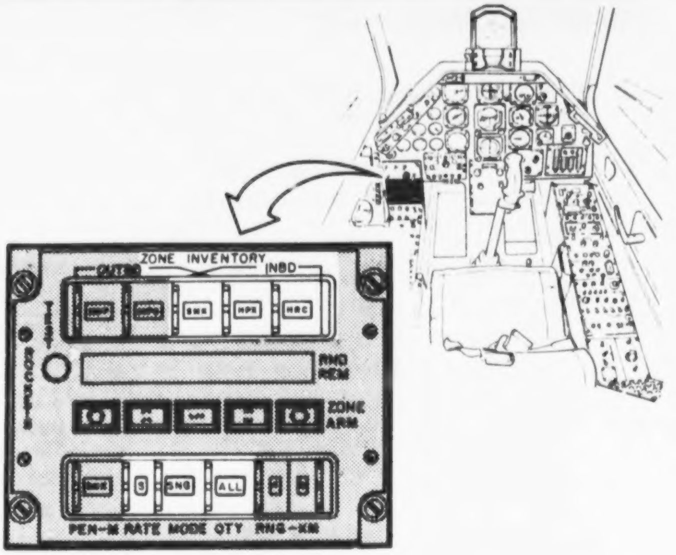
ARR82 28068

APPENDIX G - 150 HOUR ARMAMENT SUBSYSTEM CHECK (cont)

150 HOUR CHECK (cont)

30. ON ROCKETS DISPLAY UNIT, SET SWITCHES AS FOLLOWS:

    ZONE INVENTORY
      Thumbwheels in all zones to different settings
    RATE thumbwheel to S
    MODE thumbwheel to SNG
    QTY thumbwheel to 1


ZONE INVENTORY
OUTBD
INBD
ROCKETS
RND REM
ZONE ARM
S
SNG
ALL
PEN-M RATE MODE QTY RNG-KM

ROCKET MANAGEMENT SUBSYSTEM DISPLAY

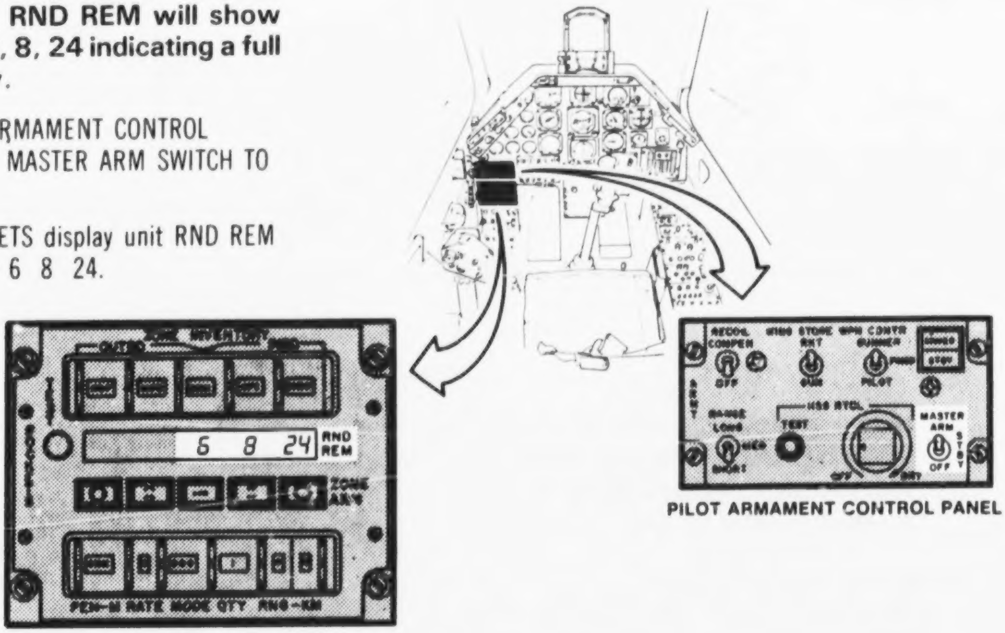
ARR82 28069A

NOTE

If outboard operation units are installed, RND REM will show 24, 8, 12, 8, 24 indicating a full inventory.

31. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO ARM.

    On ROCKETS display unit RND REM will show 6 8 24.


ZONE INVENTORY
OUTBD
INBD
ROCKETS
6 8 24
RND REM
ZONE ARM
PEN-M RATE MODE QTY RNG-KM
RECOIL COMPEN
OFF
M139 STORE RKT
GUN
WPN CONTR GUNNER
PILOT
FIXED
ARMT
RANGE LONG
MEM
SHORT
M38 RKTL
TEST
MASTER ARM
STBY
OFF

ROCKET MANAGEMENT SUBSYSTEM DISPLAY

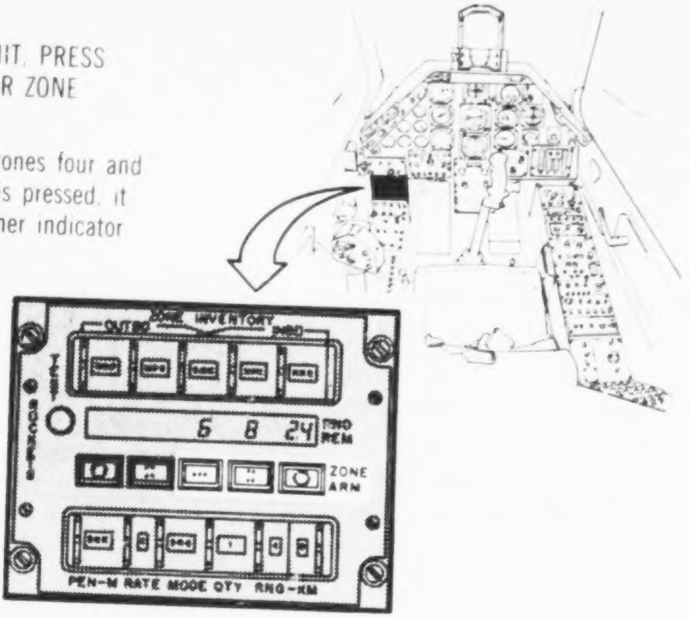
PILOT ARMAMENT CONTROL PANEL

ARR82-28070

150 HOUR CHECK (cont)

32. ON ROCKETS DISPLAY UNIT, PRESS ZONE ARM INDICATOR FOR ZONE THREE.

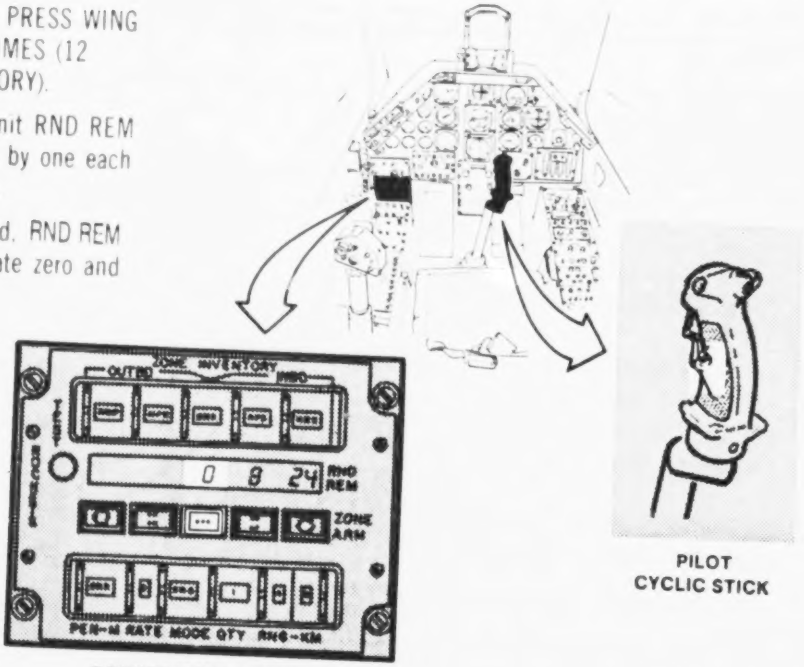
    Repeat step above for zones four and five. As each indicator is pressed, it should light and the other indicator should go out.


ZONE INVENTORY
OUTBD
INBD
ROCKETS
6 8 24
RND REM
ZONE ARM
PEN-M RATE MODE QTY RNG-KM

ROCKET MANAGEMENT SUBSYSTEM DISPLAY

ARR82 28071

33. ON PILOT CYCLIC STICK, PRESS WING ARM FIRE SWITCH SIX TIMES (12 TIMES FOR FULL INVENTORY).
    a. On ROCKETS display unit RND REM for zone five decreases by one each time switch is pressed.
    b. When last round is fired, RND REM for zone five will indicate zero and indicator will go out.


ZONE INVENTORY
OUTBD
INBD
ROCKETS
0 8 24
RND REM
ZONE ARM
PEN-M RATE MODE QTY RNG-KM
PILOT CYCLIC STICK

ROCKET MANAGEMENT SUBSYSTEM DISPLAY

ARR82 28072

APPENDIX G - 150 HOUR ARMAMENT SUBSYSTEM CHECK (cont)

150 HOUR CHECK (cont)

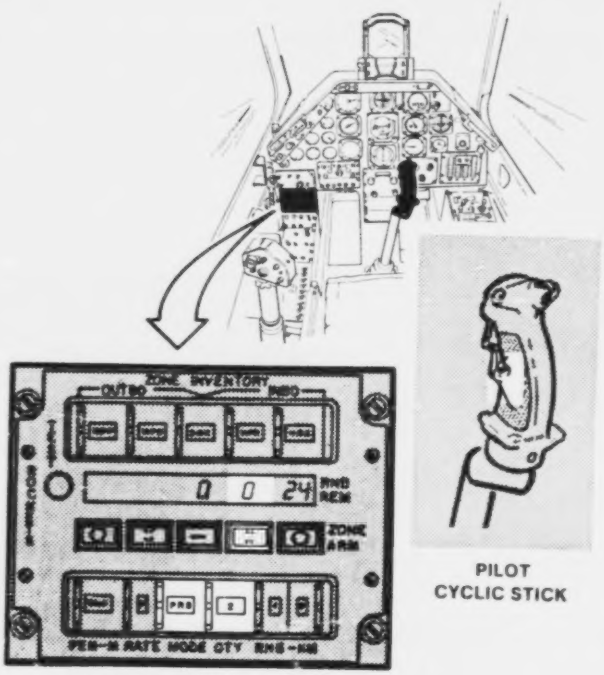
34. ON ROCKETS DISPLAY UNIT, SET SWITCHES AS FOLLOWS:

    MODE thumbwheel to PRS
    QTY thumbwheel to 2
    Press ZONE ARM indicator for zone four

35. ON PILOT CYCLIC STICK, PRESS AND HOLD WING ARM FIRE SWITCH TWICE.

    a. On ROCKETS display unit, RND REM for zone four decreases by four each time switch is pressed.

    b. RND REM for zone four will indicate zero and ZONE ARM indicator will go out.


ZONE INVENTORY
OUTBD
INBD
0 0 24
RND REM
ZONE ARM
PRS
2
PEN-M RATE MODE QTY RNG-KM

PILOT CYCLIC STICK

ROCKET MANAGEMENT SUBSYSTEM DISPLAY

ARR82-28073

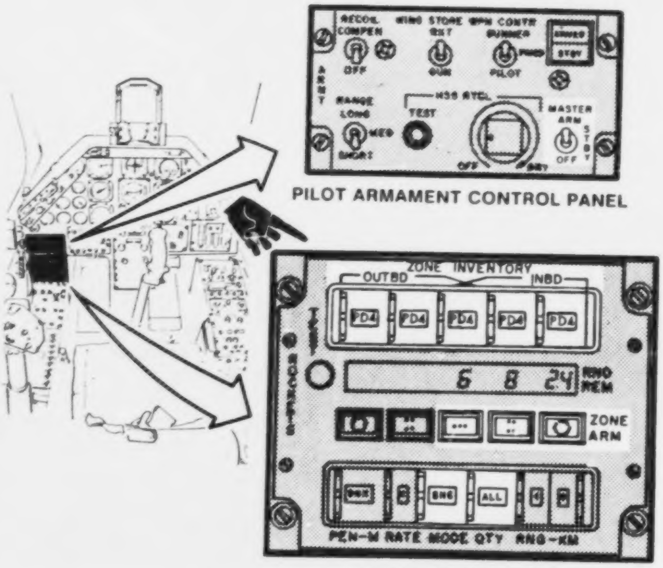
36. ON ROCKETS DISPLAY UNIT, SET SWITCHES AS FOLLOWS:

    Set ZONE INVENTORY thumbwheels to PD4
    Set MODE thumbwheel to SNG
    Set QTY thumbwheel to all

37. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO OFF THEN BACK TO ARM. THIS SIMULATES RELOADING ROCKETS.

38. ON ROCKETS DISPLAY UNIT, PRESS ZONE ARM SWITCH FOR ZONE THREE.

    All inventoried zones arm.


RECOIL COMPEN
OFF
WING STORE JETT
GUN
WPN CONTR GUNNER
PILOT
FIXED
STOW
ARMT
RANGE LONG
MED
SHORT
TEST
M28 RTCL
OFF
DAY
MASTER ARM
STBY
OFF
ZONE INVENTORY
OUTBD
INBD
PD4
PD4
PD4
PD4
PD4
6 8 24
RND REM
ZONE ARM
SNG
ALL
PEN-M RATE MODE QTY RNG-KM

PILOT ARMAMENT CONTROL PANEL

ROCKET MANAGEMENT SUBSYSTEM DISPLAY

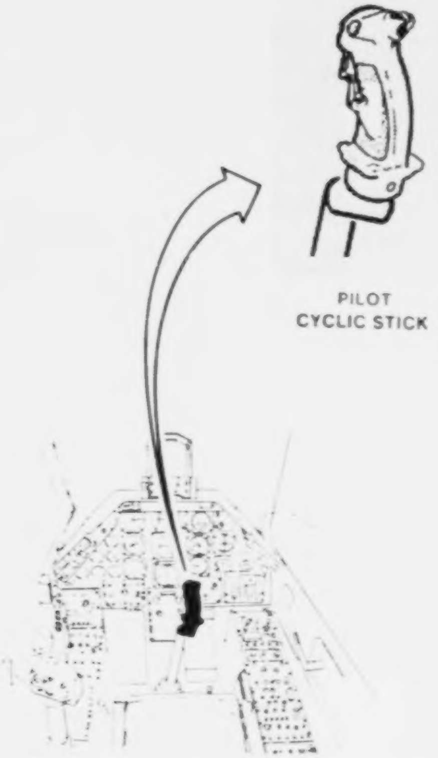
ARR82-28074

150 HOUR CHECK (cont)

39. ON PILOT CYCLIC STICK, PRESS AND HOLD WING ARM FIRE SWITCH.

   a. On ROCKETS display unit, RND REM indicates all rockets fired.

   b. Release WING ARM FIRE switch.

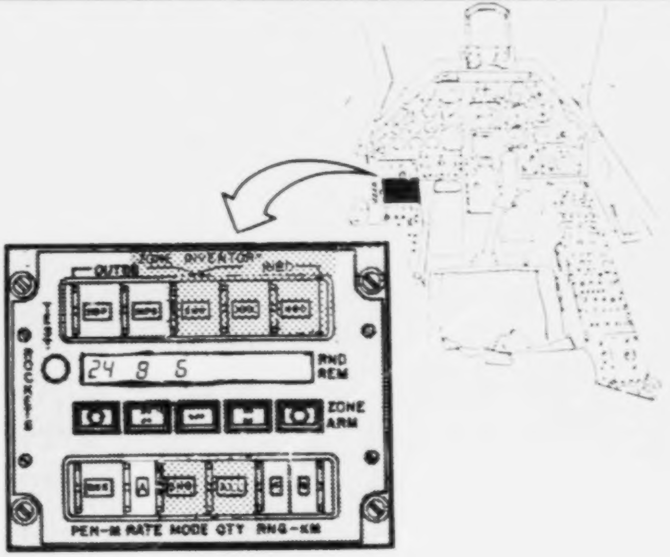

PILOT
CYCLIC STICK

NOTE

If rocket present simulators are not installed, RND REM will show full inventory.

39.1. ON ROCKETS DISPLAY UNIT, SET RATE THUMBWHEEL TO A.

RND REM will show inventory on all zones except those that have inventory from rocket present simulators.


ZONE INVENTORY
OUTBD
INBD
ROCKETS
24 8 5
RND REM
ZONE ARM
PEN-M RATE MODE QTY RNG-KM

ROCKET MANAGEMENT SUBSYSTEM DISPLAY

150 HOUR CHECK (cont)

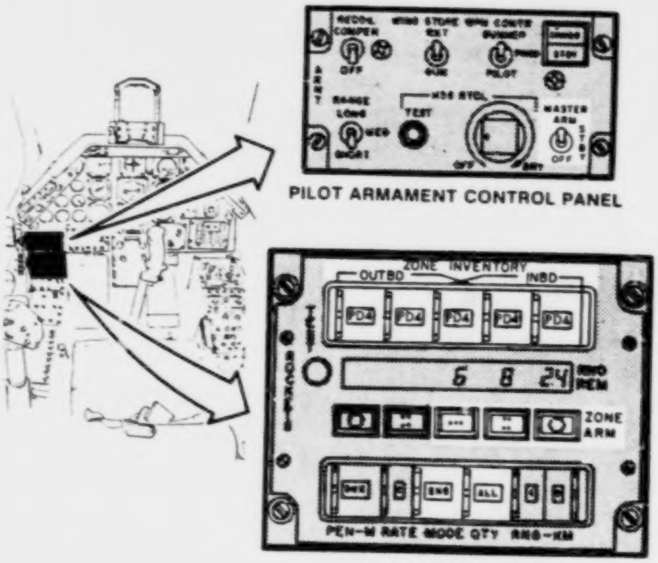
39.2. ON ROCKET DISPLAY UNIT, SET SWITCHES AS FOLLOWS:

ZONE INVENTORY thumbwheels to PD4
MODE thumbwheel to SNG
QTY thumbwheel to ALL

39.3. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO OFF, THEN BACK TO ARM. THIS SIMULATES RELOADING ROCKETS.

39.4. ON ROCKETS DISPLAY UNIT, PRESS ZONE ARM SWITCH FOR ZONE THREE.

All inventoried zones arm.


RECOIL COMPEN
OFF
WING STORE
EXT
WPN CONTR
PILOT
MASTER ARM
STBY
OFF
RANGE
TEST
ZONE INVENTORY
OUTBD
INBD
PD4
PD4
PD4
PD4
PD4
6 8 24
RND REM
ZONE ARM
ALL
PEN-M RATE MODE QTY RNG-KM

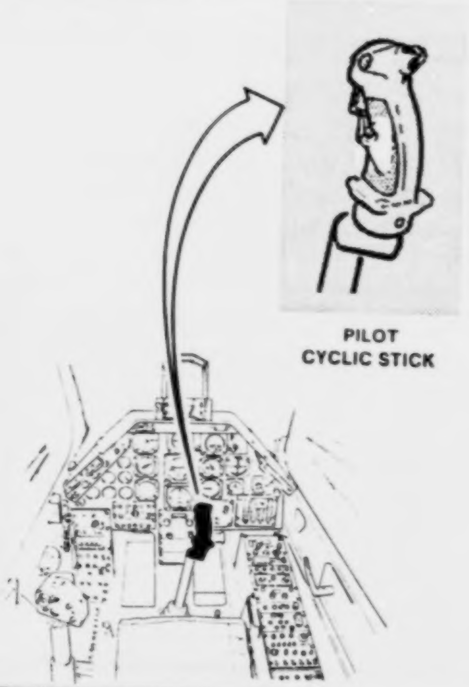
PILOT ARMAMENT CONTROL PANEL

ROCKET MANAGEMENT SUBSYSTEM DISPLAY

39.5. ON PILOT CYCLIC STICK, PRESS AND HOLD WING FIRE SWITCH.

a. On ROCKETS display unit, RND REM indicates all rockets fired.

b. Release WING ARM FIRE switch.

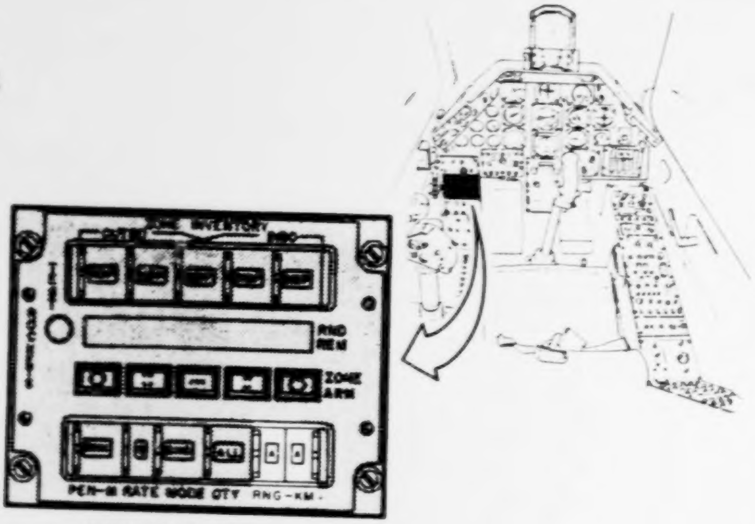


PILOT CYCLIC STICK

150 HOUR CHECK (cont)

39.6. ON ROCKETS DISPLAY UNIT, SET RNG-KM THUMBWHEELS TO A.

Verify range in upper right-hand corner of HUD display goes to zero.

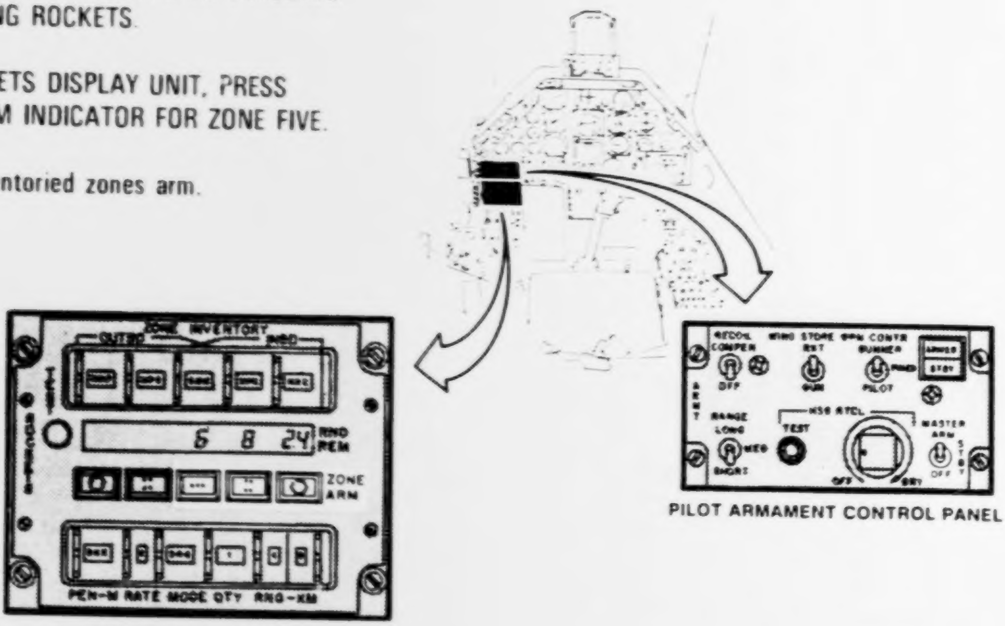

ZONE INVENTORY
OUTBD
INBD
RNG REM
ZONE ARM
PEN-M RATE MODE QTY RNG-KM

ROCKET MANAGEMENT SUBSYSTEM DISPLAY

40. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO OFF THEN BACK TO ARM TO SIMULATE RELOADING ROCKETS.

41. ON ROCKETS DISPLAY UNIT, PRESS ZONE ARM INDICATOR FOR ZONE FIVE.

All inventoried zones arm.


ZONE INVENTORY
OUTBD
INBD
6 8 24
RNG REM
ZONE ARM
PEN-M RATE MODE QTY RNG-KM
RECOIL COMPEN
OFF
WING STORE RKT
GUN
GPN CONTR GUNNER
FIXED
PILOT
ARMED
STBY
ARMT
RANGE
LONG
MED
SHORT
M58 RTCL
TEST
OFF
BRT
MASTER ARM
STBY
OFF

ROCKET MANAGEMENT SUBSYSTEM DISPLAY

PILOT ARMAMENT CONTROL PANEL

APPENDIX G - 150 HOUR ARMAMENT SUBSYSTEM CHECK (cont)

150 HOUR CHECK (cont)

42. ON GUNNER ARMAMENT CONTROL PANEL, SET PLT ORIDE SWITCH TO PLT ORIDE.

    ARMED indicator lights.

43. ON PILOT CYCLIC STICK, PRESS WING ARM FIRE SWITCH.

    On rockets display unit, RND REM does not decrease.

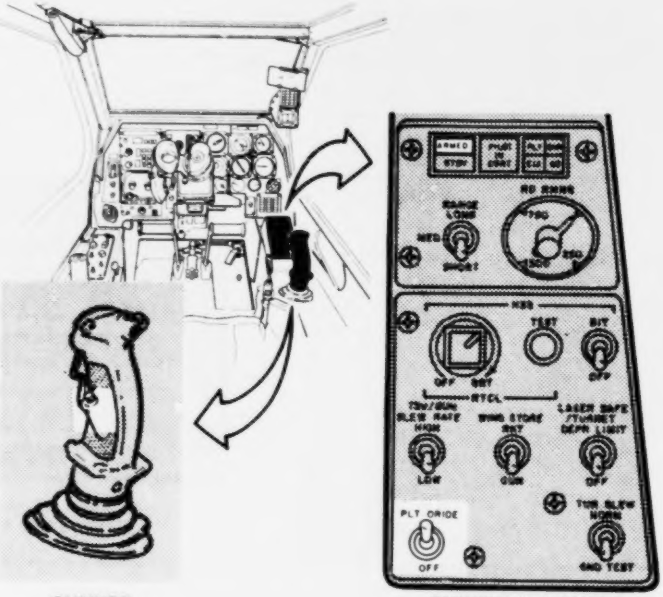
44. ON GUNNER CYCLIC STICK, PRESS AND HOLD ARM FIRE SWITCH.

    a. On rockets display unit, RND REM indicates all rockets fired.

    b. Release WING ARM FIRE switch.

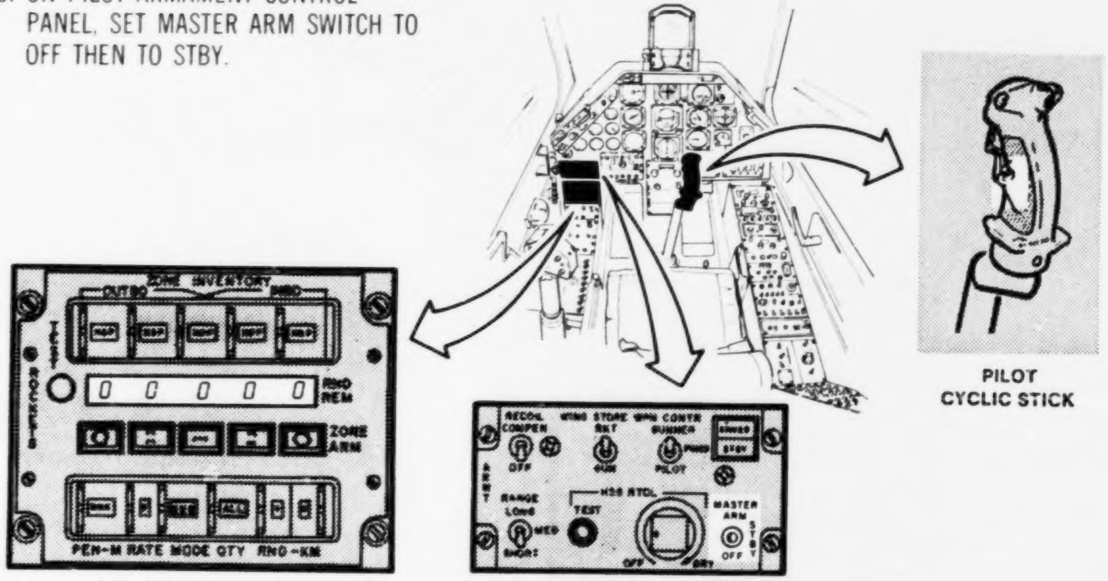
45. ON GUNNER ARMAMENT CONTROL PANEL, SET PLT ORIDE SWITCH TO OFF.

46. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO OFF THEN TO STBY.


ARMED
STBY
RANGE
LONG
MED
SHORT
TEST
OFF
WING STORE
RKT
GUN
PLT ORIDE
OFF
GND TEST

GUNNER CYCLIC STICK

GUNNER ARMAMENT CONTROL PANEL


ZONE INVENTORY
OUTBD
INBD
TEST
ROCKETS
0 0 0 0 0
RND REM
ZONE ARM
PEN-M RATE MODE QTY RND-KM
RECOIL COMPEN
OFF
WING STORE
RKT
GUN
WPN CONTR
GUNNER
PILOT
ARMT
RANGE
LONG
MED
SHORT
H20 RTCL
TEST
OFF
BRT
MASTER ARM
STBY
OFF

PILOT CYCLIC STICK

ROCKET MANAGEMENT SUBSYSTEM DISPLAY

PILOT ARMAMENT CONTROL PANEL

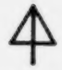
ARR82-28077

150 HOUR CHECK (cont)

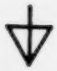
47. ON TOW CONTROL PANEL, SET MODE SELECT SWITCH TO TSU GUN.

    After self test is completed, PWR ON indicator will appear.

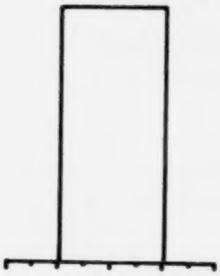
48. ON TOW CONTROL PANEL, PRESS AND HOLD BIT BUTTON THEN, OBSERVE HUD FOR FOLLOWING PRELAUNCH SYMBOLS:



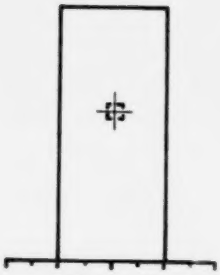
ASCEND SYMBOL



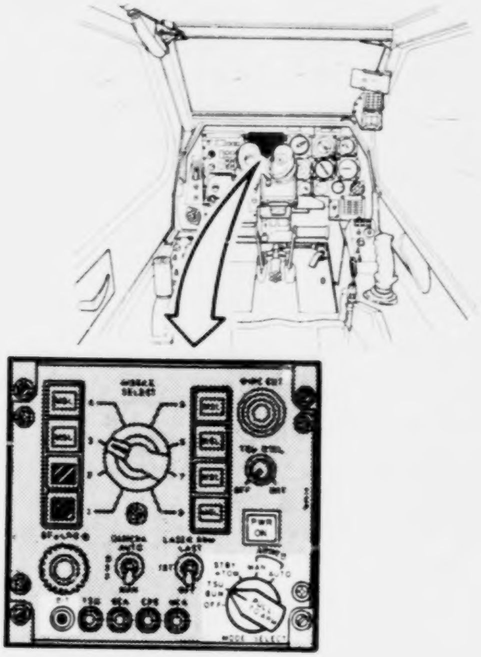
DESCEND SYMBOL



PRELAUNCH RECTANGLE

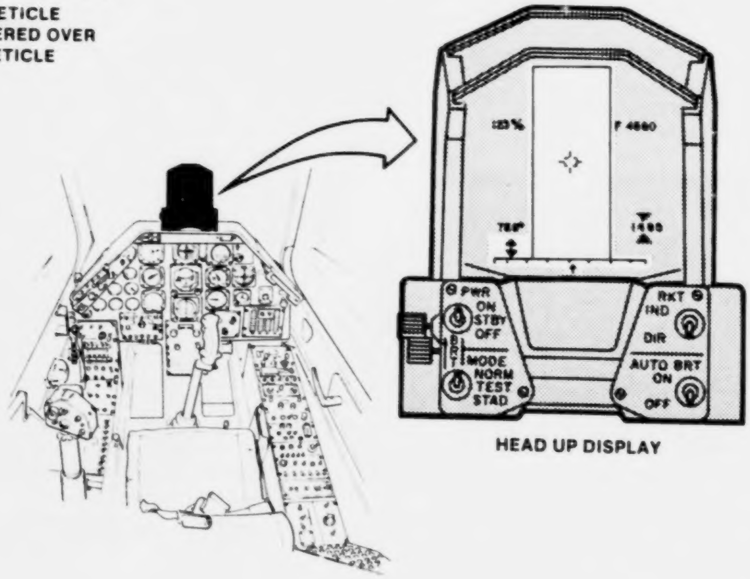


LOS RETICLE CENTERED OVER ADI RETICLE



MISSILE SELECT
WIRE CUT
TSU STBL
PWR ON
STBY
TSU GUN
OFF
MAN
AUTO
MODE SELECT

TOW CONTROL PANEL



PWR
ON
STBY
OFF
BRT
MODE
NORM
TEST
STAD
RKT
IND
DIR
AUTO BRT
ON
OFF

HEAD UP DISPLAY

ARR82-28078

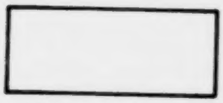
APPENDIX G - 150 HOUR ARMAMENT SUBSYSTEM CHECK (cont)

150 HOUR CHECK (cont)

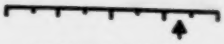
NOTE

When BIT button is released, symbols listed below will move rapidly on HUD. Repeat test until all symbols have been observed.

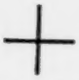
49. ON TOW CONTROL PANEL, RELEASE BIT BUTTON AND OBSERVE FOLLOWING POST-LAUNCH SYMBOLS ON HUD.



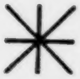
POST-LAUNCH RECTANGLE IS SEEN MOMENTARILY



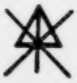
COARSE AZIMUTH POINTER MOVES



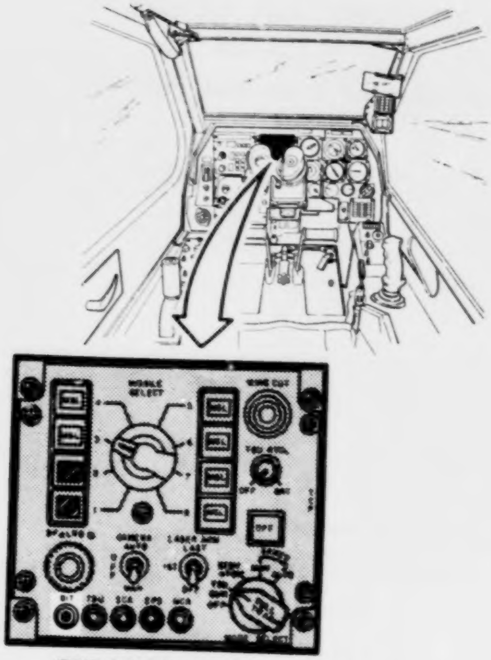
LOS RETICLE MOVES IN AZIMUTH AND ELEVATION



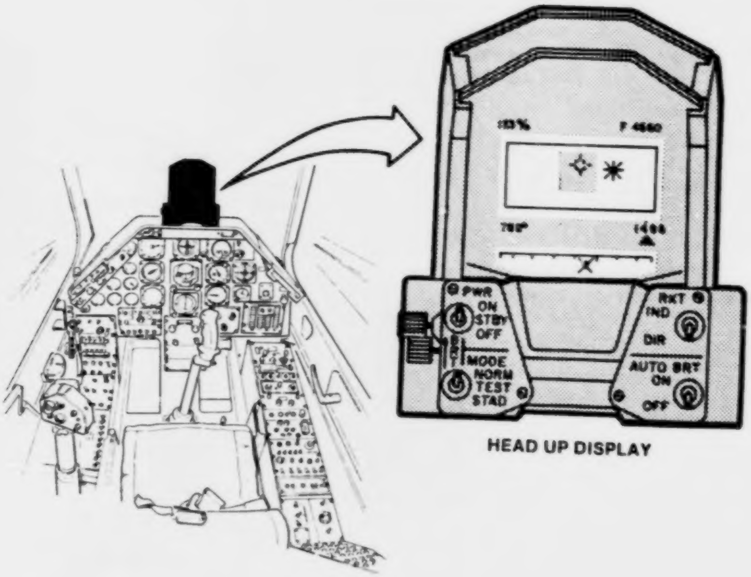
CAUTION SYMBOL OVERLAYS LOS RETICLE



CAUTION SYMBOL OVERLAYS COARSE AZIMUTH POINTER


MISSILE SELECT
WIRE CUT
OFF

TOW CONTROL PANEL


PWR
ON
STBY
OFF
MODE
NORM
TEST
STAD
RKT
IND
DIR
AUTO BRT
ON
OFF

HEAD UP DISPLAY

ARR82-28079

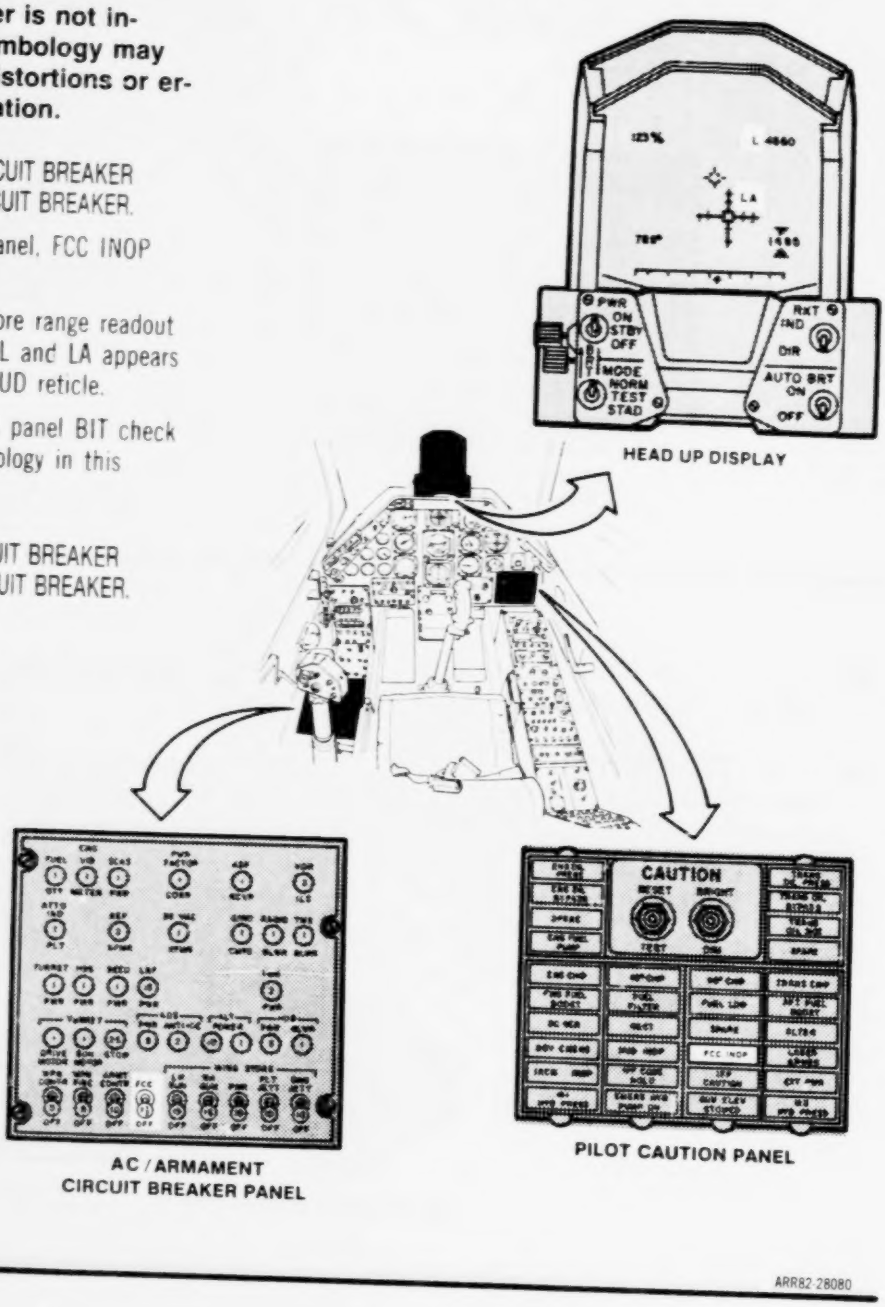
150 HOUR CHECK (cont)

NOTE

The following check verifies operation of a fire control system backup mode. If a laser rangefinder is not installed, HUD symbology may contain some distortions or erroneous information.

50. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, OPEN FCC CIRCUIT BREAKER.
    - a. On pilot caution panel, FCC INOP lights.
    - b. On HUD, letter before range readout changes from F to L and LA appears in upper right of HUD reticle.
    - c. Repeat TOW control panel BIT check to verify HUD symbology in this mode.

51. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, CLOSE FCC CIRCUIT BREAKER.


L 4660
LA
PWR
ON
STBY
OFF
BIT
MODE
NORM
TEST
STAD
RKT
IND
DIR
AUTO BRT
ON
OFF
HEAD UP DISPLAY
AC / ARMAMENT
CIRCUIT BREAKER PANEL
FCC
OFF
CAUTION
RESET
BRIGHT
FCC INOP
PILOT CAUTION PANEL
ARR82-28080

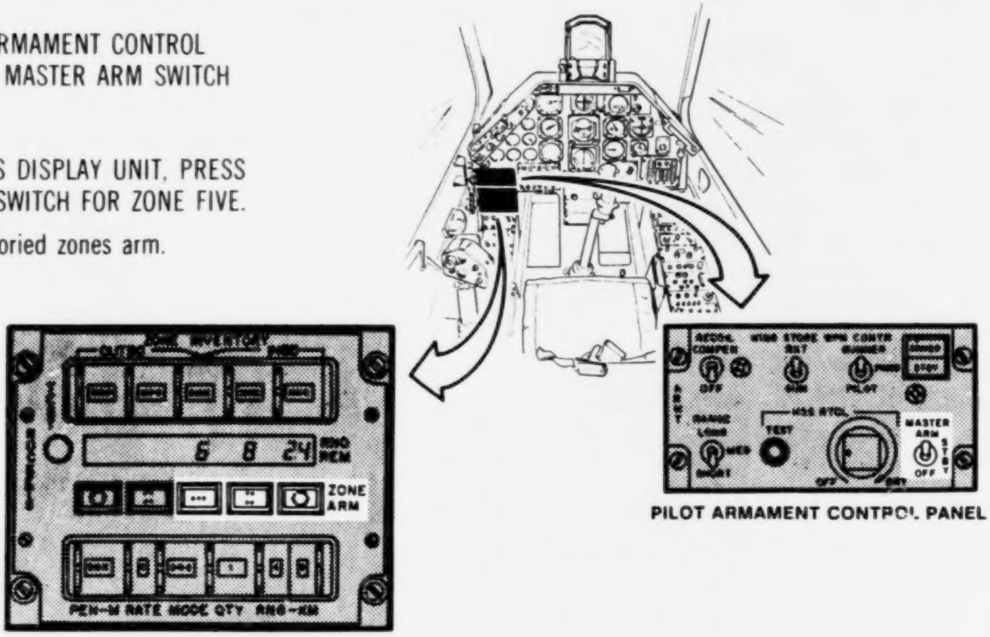
APPENDIX G - 150 HOUR ARMAMENT SUBSYSTEM CHECK (cont)

150 HOUR CHECK (cont)

52. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO ARM.

53. ON ROCKETS DISPLAY UNIT, PRESS ZONE ARM SWITCH FOR ZONE FIVE.

    All inventoried zones arm.


ZONE INVENTORY
OUTBD
INBD
6 8 24
RKD REM
ZONE ARM
PEN-M RATE MODE QTY RNG-KM
RECOIL COMPEN
OFF
WING STORE EXT
ARM
SPS CONTR
GUNNER
PILOT
RANGE
LONG
MED
SHORT
TEST
M36 RTCL
OFF
MASTER ARM
STBY
OFF

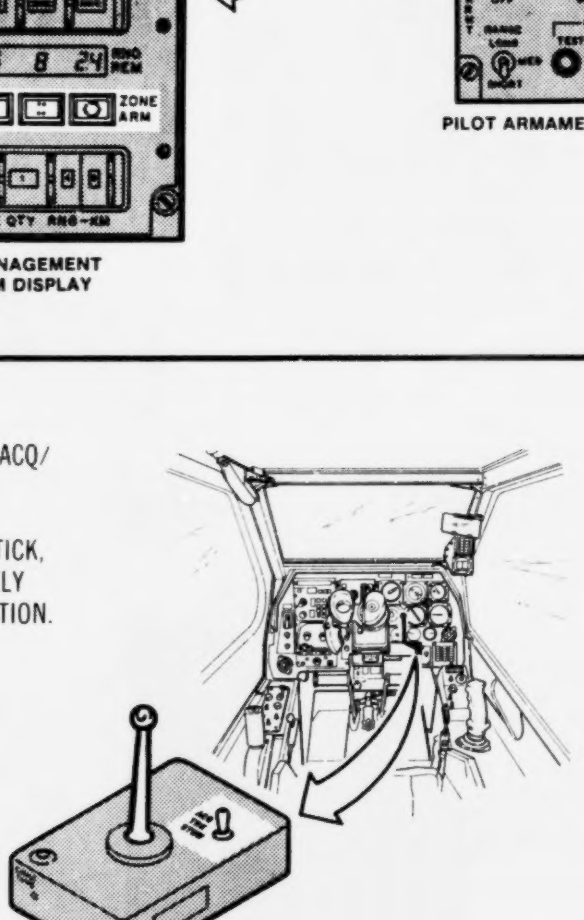
PILOT ARMAMENT CONTROL PANEL

ROCKET MANAGEMENT SUBSYSTEM DISPLAY

ARR82-28081

54. ON SIGHT HAND CONTROL, SET ACQ/TRK/STOW SWITCH TO TRK.

55. USING SIGHT HAND CONTROL STICK, POSITION TSU TO APPROXIMATELY 45° RIGHT AZIMUTH 0° ELEVATION.



SIGHT HAND CONTROL BOX

ARR82-28082

150 HOUR CHECK (cont)

NOTE

The following test is performed to make sure that rockets cannot be fired until the turret has cleared the rocket flight path.

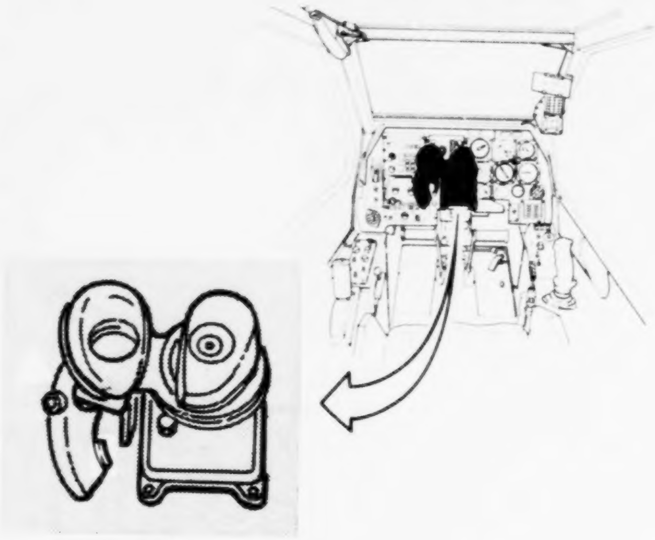
56. PRESS AND HOLD TSU LHG ACTION AND TRIGGER SWITCHES.

    Turret slews to TSU LOS and M197 gun rotates.

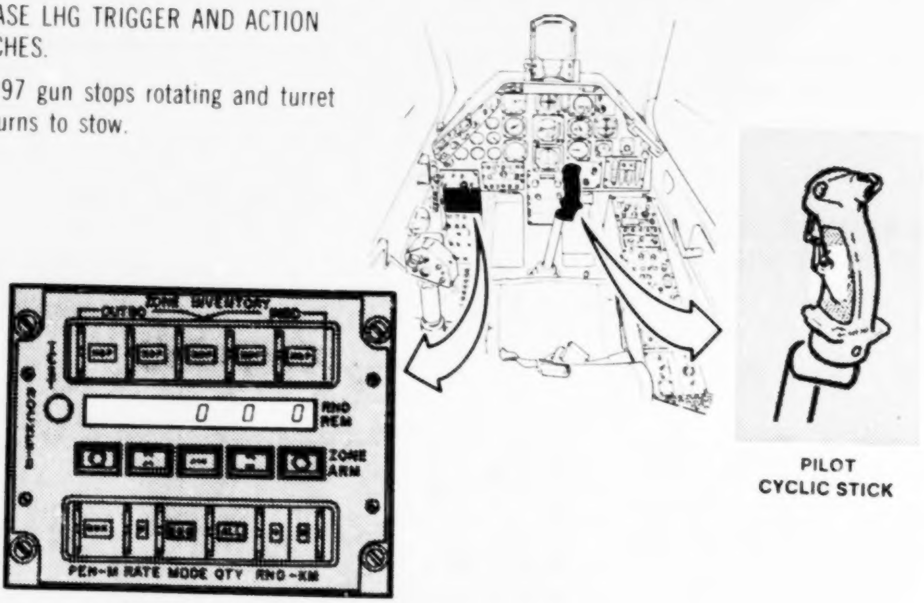
57. ON PILOT CYCLIC STICK, PRESS AND HOLD WING ARM FIRE SWITCH.
    a. M197 gun stops rotating and turret goes to STOW position.
    b. On rockets display unit RND REM indicates all rockets fired.
    c. Turret returns to TSU LOS and gun starts rotating.

58. RELEASE LHG TRIGGER AND ACTION SWITCHES.

    M197 gun stops rotating and turret returns to stow.



TSU


ZONE INVENTORY
OUTBD
INBD
ROCKETS
0 0 0
RND REM
ZONE ARM
PEN-M RATE MODE QTY RND-KM

ROCKET MANAGEMENT SUBSYSTEM DISPLAY

PILOT CYCLIC STICK

ARR82 28083

APPENDIX G - 150 HOUR ARMAMENT SUBSYSTEM CHECK (cont)

150 HOUR CHECK (cont)

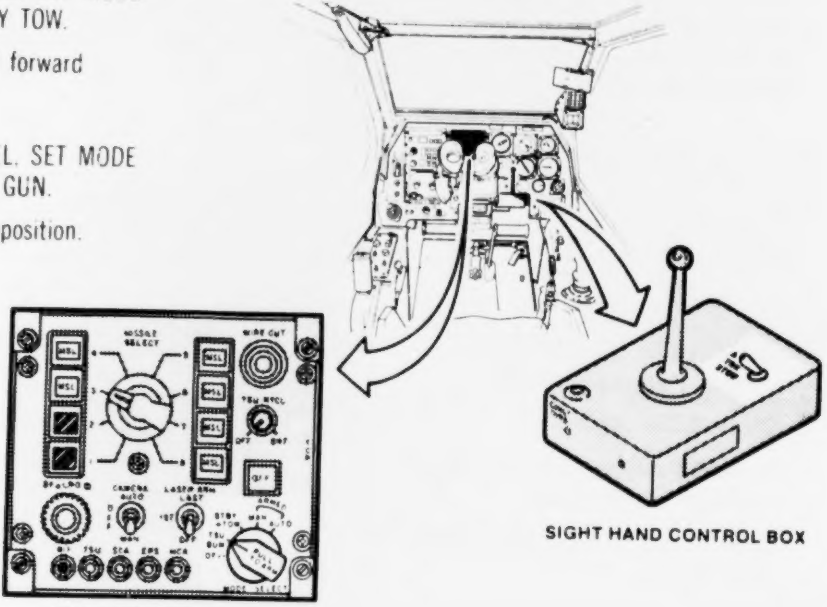
59. ON SIGHT HAND CONTROL, SET ACQ/TRK/STOW SWITCH TO STOW.

60. ON TOW CONTROL PANEL, SET MODE SELECT SWITCH TO STBY TOW.

    Turret moves to fixed forward position.

61. ON TOW CONTROL PANEL, SET MODE SELECT SWITCH TO TSU GUN.

    Turret moves to stow position.


MISSILE SELECT
WIRE CUT
MSL
TSU RTCL
OFF
BRT
CAMERA AUTO
LASER ARM
LAST
MODE SELECT
STBY STOW
TSU GUN
MAN
AUTO
ARMED
TSU
SCA
EPS

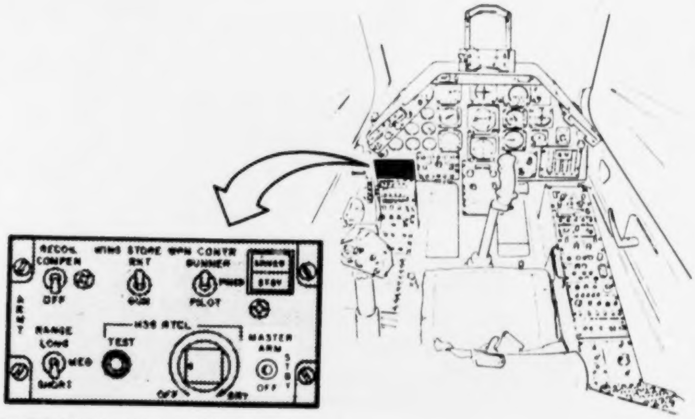
TOW CONTROL PANEL

SIGHT HAND CONTROL BOX

ARR82-28084

PARAGRAPHS 62 THROUGH 67 DELETED

68. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO STBY.


RECOIL COMPEN
OFF
WING STORE
RKT
GUN
WPN CONTR
GUNNER
FIXED
PILOT
ARMED
STBY
ARMT
RANGE
LONG
MED
SHORT
M28 RTCL
TEST
OFF
BRT
MASTER ARM
STBY
OFF

PILOT ARMAMENT CONTROL PANEL

ARR82-28088

PAGES G-25 AND G-26 DELETED

150 HOUR CHECK (cont)

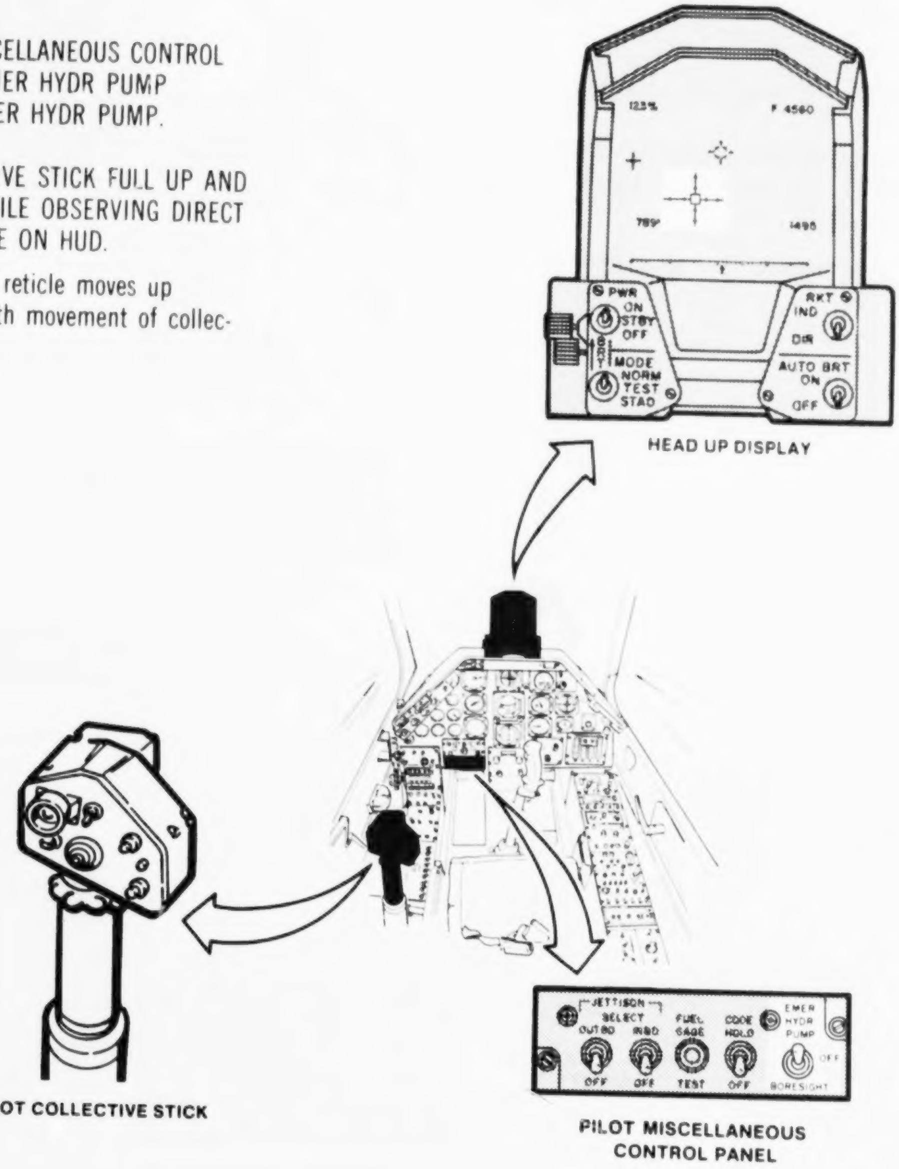
CAUTION

Make sure all hydraulic lines and flight controls are connected.

63. ON PILOT MISCELLANEOUS CONTROL PANEL, SET EMER HYDR PUMP SWITCH TO EMER HYDR PUMP.

64. RAISE COLLECTIVE STICK FULL UP AND FULL DOWN WHILE OBSERVING DIRECT ROCKET RETICLE ON HUD.

Direct rocket reticle moves up and down with movement of collective stick.


123%
F 4560
789
1495
PWR
ON
STBY
OFF
BRT
MODE
NORM
TEST
STAD
RKT
IND
DIR
AUTO BRT
ON
OFF
HEAD UP DISPLAY
PILOT COLLECTIVE STICK
JETTISON
SELECT
OUTBD
INBD
FUEL GAGE
CODE HOLD
EMER HYDR PUMP
OFF
OFF
TEST
OFF
BORESIGHT
OFF
PILOT MISCELLANEOUS CONTROL PANEL
ARR82-28086

APPENDIX G - 150 HOUR ARMAMENT SUBSYSTEM CHECK (cont)

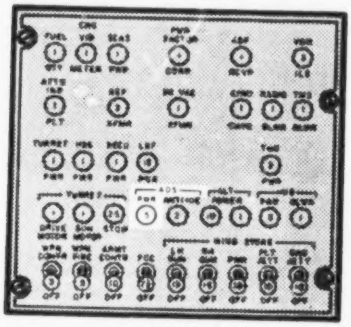
150 HOUR CHECK (cont)

65. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, OPEN ADS PWR CIRCUIT BREAKER.

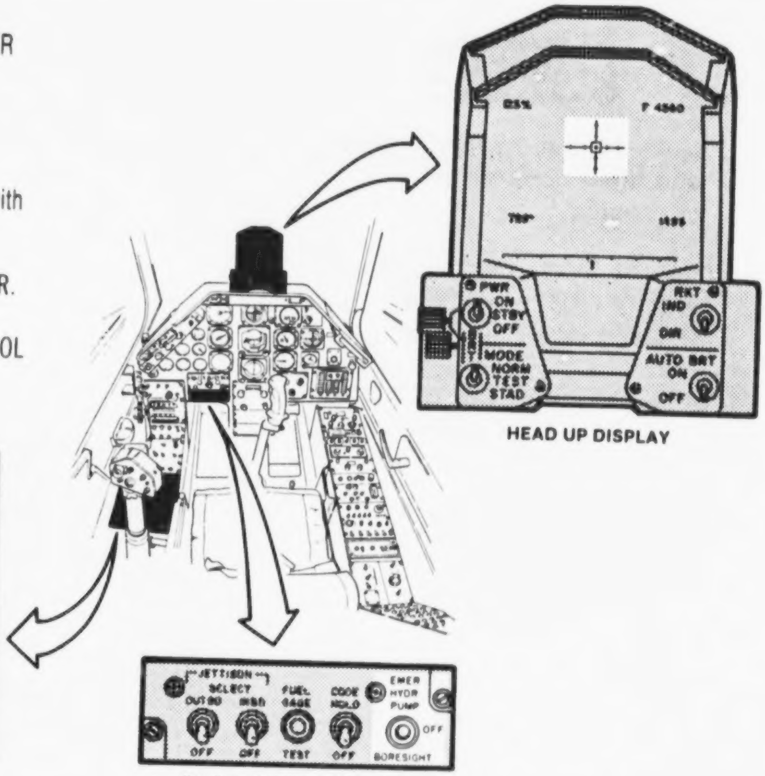
    On HUD, direct rocket reticle will overlay boresight reference reticle with collective down.

66. CLOSE ADS PWR CIRCUIT BREAKER.

67. ON PILOT MISCELLANEOUS CONTROL PANEL, SET EMER HYDR PUMP SWITCH TO OFF.



AC / ARMAMENT CIRCUIT BREAKER PANEL

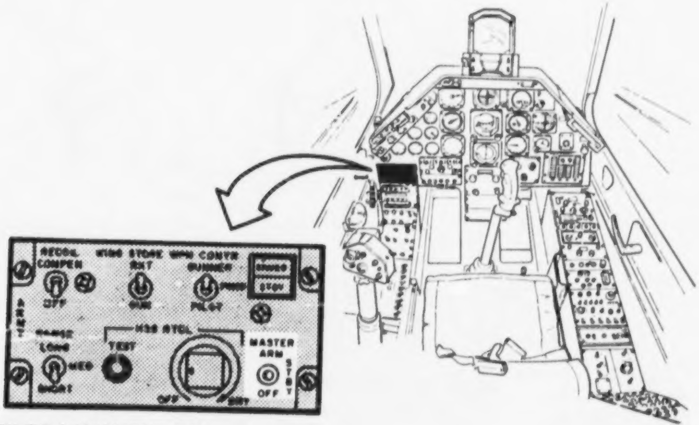

PWR
ON
STBY
OFF
MODE
NORM
TEST
STAD
RKT
IND
DIR
AUTO BRT
ON
OFF
JETTISON
SELECT
OUTBD
INBD
FUEL
GAGE
CODE
HOLD
EMER
HYDR
PUMP
OFF
OFF
TEST
OFF
OFF
BORESIGHT

HEAD UP DISPLAY

PILOT MISCELLANEOUS CONTROL PANEL

ARR82-28087

68. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO STBY.

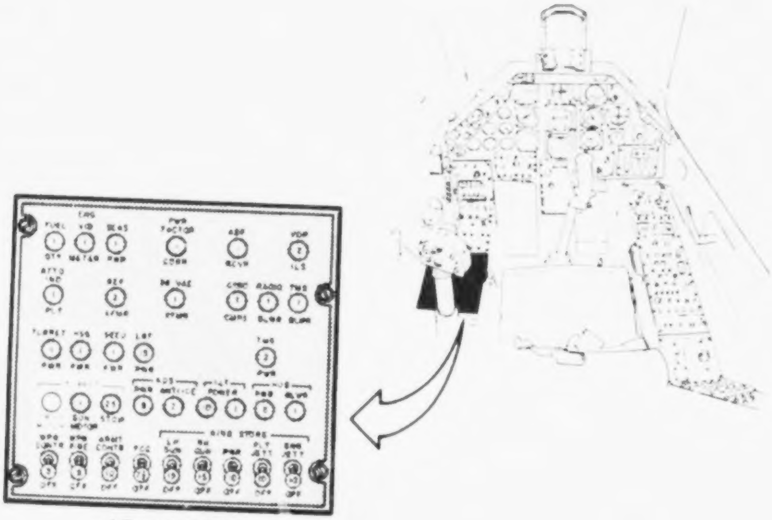

RECOIL
COMPEN
OFF
WING STORE
RKT
WPN CONTR
GUNNER
PILOT
ARMED
STBY
RANGE
LONG
MED
SHORT
TEST
OFF
MASTER
ARM
STBY
OFF

PILOT ARMAMENT CONTROL PANEL

ARR82-28088

150 HOUR CHECK (cont)

69. ON AC/ARMAMENT CIRCUIT BREAKER PANEL. OPEN TURRET DRIVE MOTOR CIRCUIT BREAKER.


FUEL
TURRET
RADIO
GUN MOTOR
STOP
WING STORE

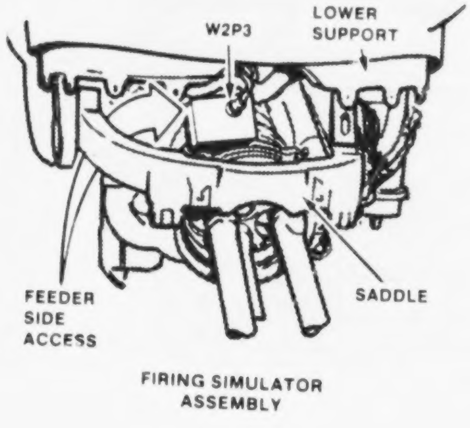
AC / ARMAMENT
CIRCUIT BREAKER PANEL

ARR82 28089

WARNING

Do not put hands between lower support and saddle, personal injury could result.

70. DISCONNECT FIRE VOLTS CABLE W2P3 FROM M197 GUN AND RECONNECT CABLE TO FIRING SIMULATOR ASSEMBLY. WORK FROM FEEDER SIDE ACCESS.


W2P3
LOWER SUPPORT
FEEDER SIDE ACCESS
SADDLE

FIRING SIMULATOR
ASSEMBLY

ARR82 28090

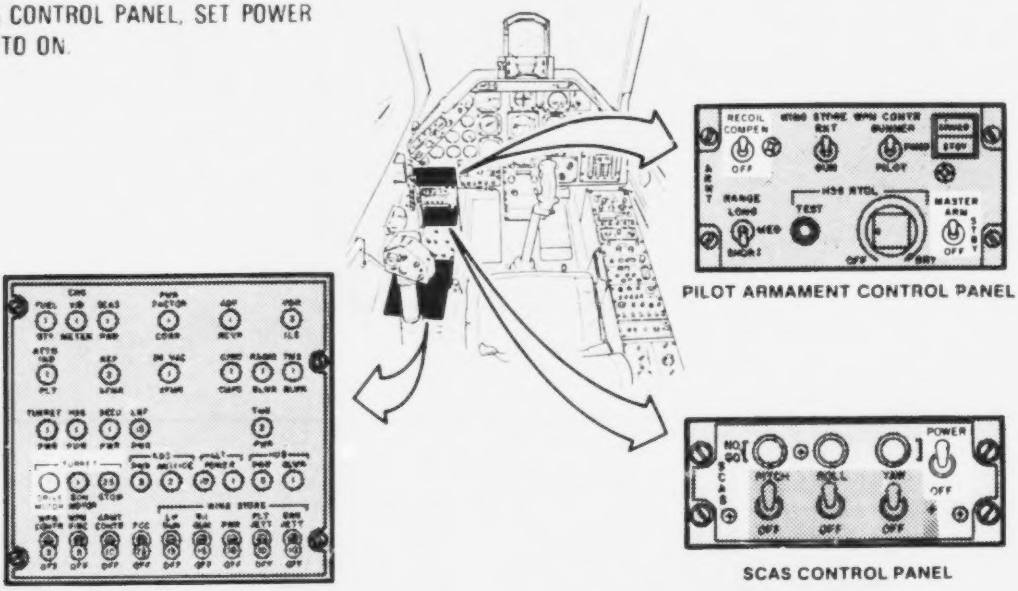
APPENDIX G - 150 HOUR ARMAMENT SUBSYSTEM CHECK (cont)

150 HOUR CHECK (cont)

71. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, CLOSE TURRET DRIVE MOTOR CIRCUIT BREAKER.

72. ON PILOT ARMAMENT CONTROL PANEL. SET RECOIL COMPEN SWITCH TO RECOIL COMPEN AND MASTER ARM SWITCH TO ARM.

73. ON SCAS CONTROL PANEL, SET POWER SWITCH TO ON.


RECOIL
COMPEN
OFF
ARMT
RANGE
LONG
MED
SHORT
TEST
MASTER
ARM
STBY
OFF
NO
GO
SCAS
PITCH
ROLL
YAW
POWER
OFF
TURRET

PILOT ARMAMENT CONTROL PANEL

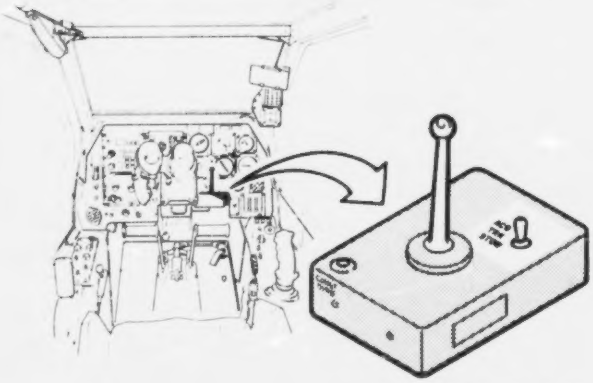
SCAS CONTROL PANEL

AC / ARMAMENT
CIRCUIT BREAKER PANEL

ARR82-28091

74. ON SIGHT HAND CONTROL, SET ACQ/TRK/STOW SWITCH TO TRK.

75. USING SIGHT HAND CONTROL STICK, POSITION AND HOLD TSU LOS TO APPROXIMATELY 90° LEFT AZIMUTH 0° ELEVATION.

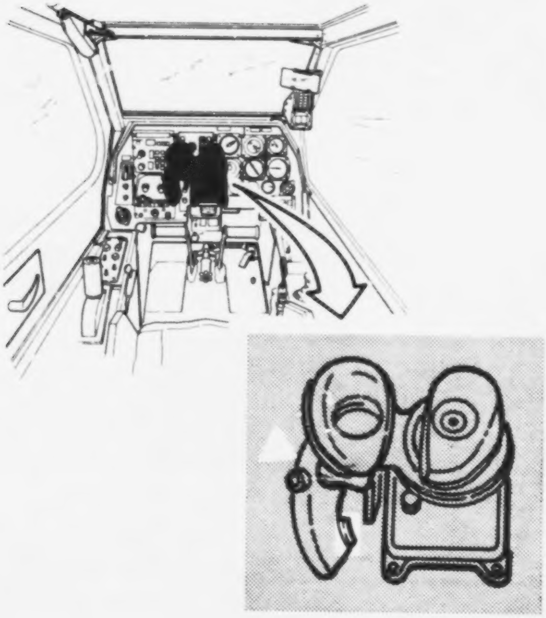


SIGHT HAND CONTROL BOX

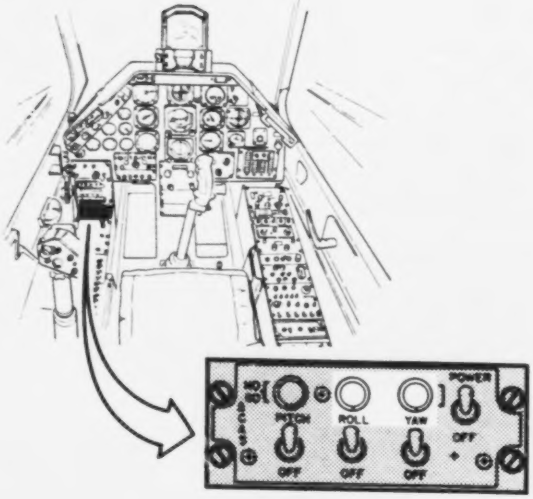
ARR82-28092

150 HOUR CHECK (cont)

76. ON TSU, PRESS AND HOLD LHG ACTION AND TRIGGER SWITCHES.
    a. Turret slews to left and M197 gun rotates.
    b. On SCAS control panel, roll and yaw lights should light.
77. RELEASE LHG ACTION AND TRIGGER SWITCHES.



TSU


NO GO
PITCH
ROLL
YAW
POWER
OFF
OFF
OFF
OFF
SCAS

SCAS CONTROL PANEL

ARR82-28093

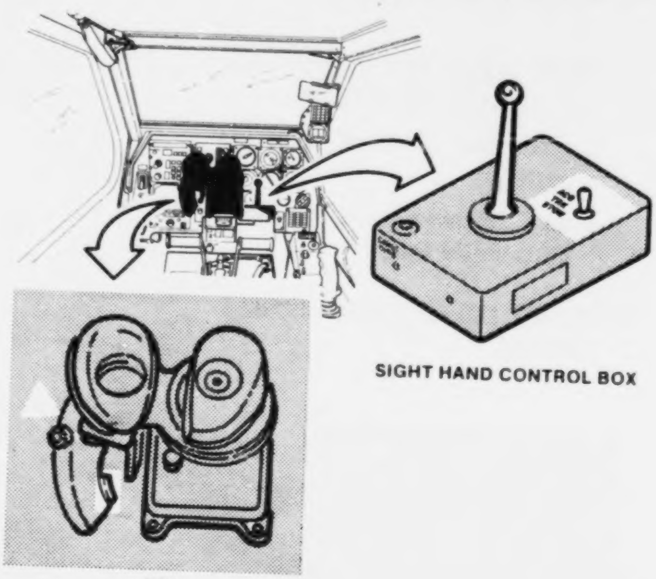
APPENDIX G - 150 HOUR ARMAMENT SUBSYSTEM CHECK (cont)

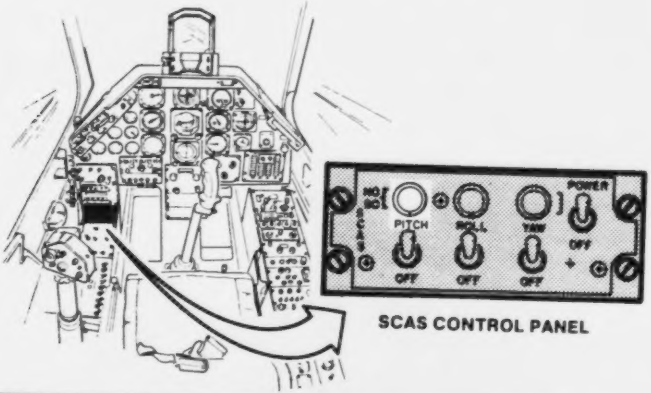
150 HOUR CHECK (cont)

78. USING SIGHT HAND CONTROL STICK, POSITION AND HOLD TSU LOS TO APPROXIMATELY 0° AZIMUTH 0° ELEVATION.

79. ON TSU, PRESS AND HOLD LHG ACTION AND TRIGGER SWITCHES.
    a. Turret slews to 0° AZ 0° EL and M197 gun rotates.
    b. On SCAS control panel, pitch light should light.

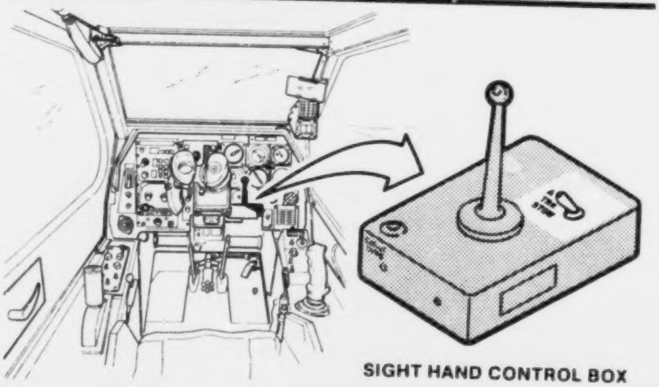
80. RELEASE LEFT-HAND GRIP ACTION AND TRIGGER SWITCHES.


SIGHT HAND CONTROL BOX
TSU


PITCH
ROLL
YAW
POWER
OFF
OFF
OFF
OFF
SCAS CONTROL PANEL

ARR82-28094

81. ON SIGHT HAND CONTROL, SET ACQ/TRK/STOW SWITCH TO STOW.

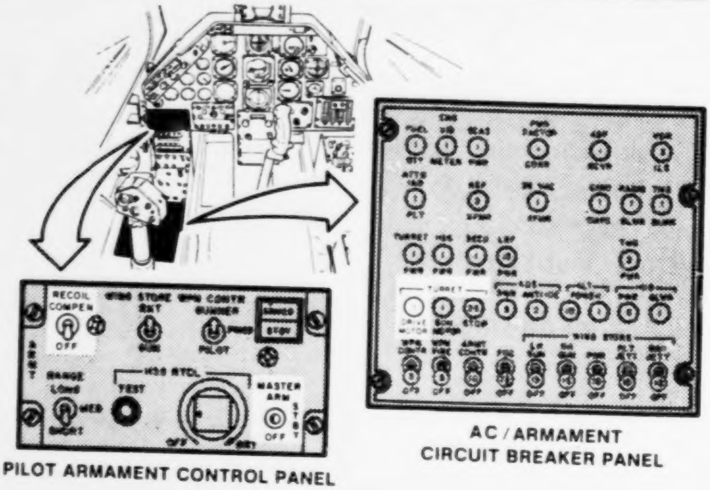

SIGHT HAND CONTROL BOX

ARR82-28095

150 HOUR CHECK (cont)

82. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO STBY AND RECOIL COMPEN SWITCH TO OFF.

83. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, OPEN TURRET DRIVE MOTOR CIRCUIT BREAKER.


RECOIL COMPEN
OFF
GUN
PILOT
STBY
RANGE
LONG
MED
SHORT
TEST
MASTER ARM
OFF
TURRET
DRIVE MOTOR

PILOT ARMAMENT CONTROL PANEL

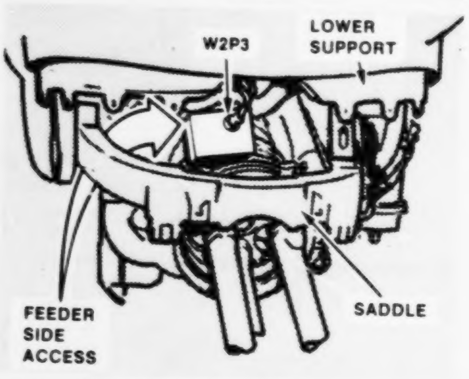
AC / ARMAMENT CIRCUIT BREAKER PANEL

ARR82-28096

WARNING

Do not put hands between lower support and saddle, personal injury could result.

84. DISCONNECT FIRE VOLTS CABLE W2P3 FROM FIRING SIMULATOR ASSEMBLY AND RECONNECT CABLE TO M197 GUN. WORK FROM FEEDER SIDE ACCESS.

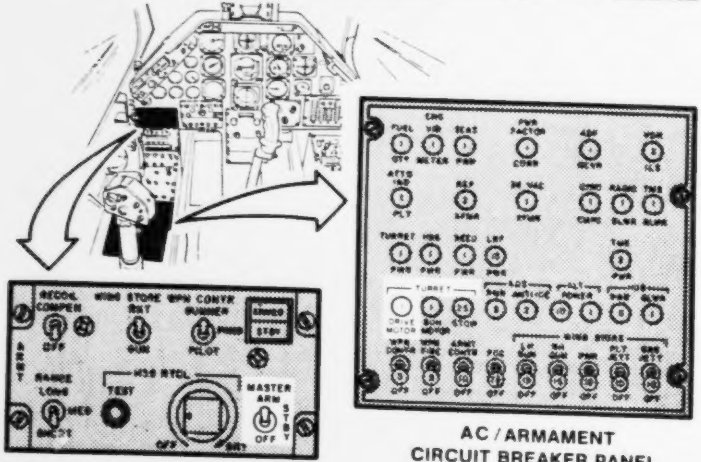

W2P3
LOWER SUPPORT
FEEDER SIDE ACCESS
SADDLE

FIRING SIMULATOR ASSEMBLY

ARR82 28097

85. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, CLOSE TURRET DRIVE MOTOR CIRCUIT BREAKER.

86. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO ARM.


RECOIL COMPEN
OFF
GUN
PILOT
STBY
RANGE
LONG
MED
SHORT
TEST
MASTER ARM
OFF
TURRET
DRIVE MOTOR

PILOT ARMAMENT CONTROL PANEL

AC / ARMAMENT CIRCUIT BREAKER PANEL

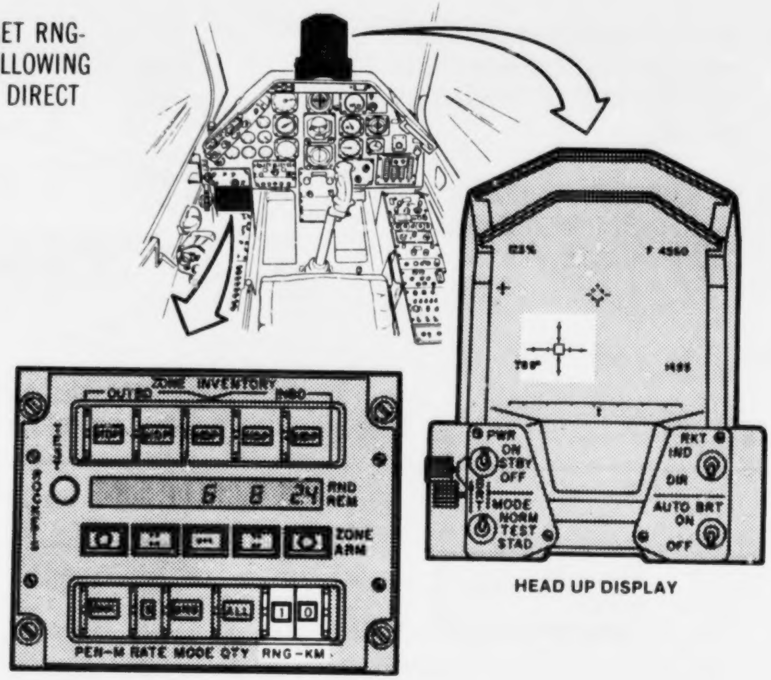
ARR82-28098

APPENDIX G - 150 HOUR ARMAMENT SUBSYSTEM CHECK (cont)

150 HOUR CHECK (cont)

87. ON ROCKETS DISPLAY UNIT, SET RNG-KM THUMBWHEELS TO THE FOLLOWING POSITIONS WHILE OBSERVING DIRECT ROCKET RETICLE ON HUD:

    RNG-KM to 2.0
      Reticle moves.
    RNG-KM to 1.0
      Reticle moves.
    RNG-KM to 3.0
      Reticle moves.
    RNG-KM to 4.0
      Reticle moves.


ZONE INVENTORY
OUTBD
INBD
6 8 24
RND REM
ZONE ARM
ROCKETS
PEN-M RATE MODE QTY RNG-KM
1 0
PWR
ON
STBY
OFF
MODE
NORM
TEST
STAD
RKT
IND
DIR
AUTO BRT
ON
OFF

HEAD UP DISPLAY

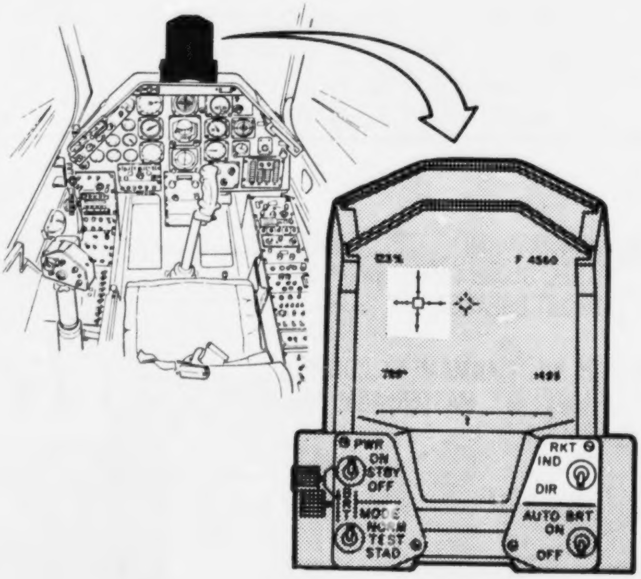
ROCKET MANAGEMENT SUBSYSTEM DISPLAY

ARR82-28099

88. ON HUD, SET RKT SWITCH TO IND.

    Direct rocket reticle moves and changes to indirect rocket reticle.

89. ON HUD, SET RKT SWITCH TO DIR.


PWR
ON
STBY
OFF
MODE
NORM
TEST
STAD
RKT
IND
DIR
AUTO BRT
ON
OFF

HEAD UP DISPLAY

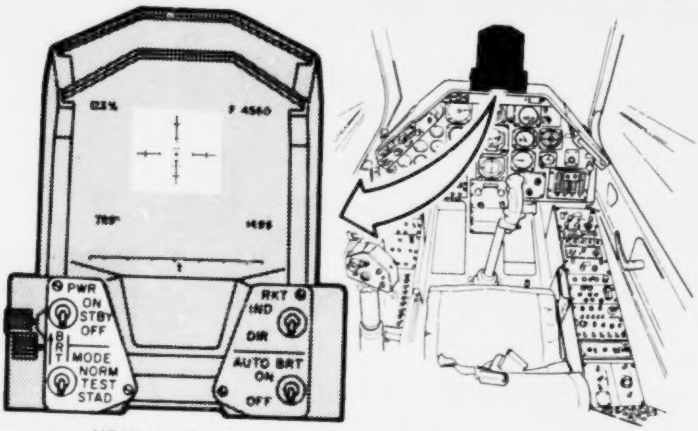
ARR82-28100

150 HOUR CHECK (cont)

90. ON HUD, SET MODE SWITCH TO STAD.

    Stadiametric reticle is displayed.

91. ON HUD, SET PWR SWITCH TO OFF.


PWR
ON
STBY
OFF
BRT
MODE
NORM
TEST
STAD
RKT
IND
DIR
AUTO BRT
ON
OFF

HEAD UP DISPLAY

ARR82-28101

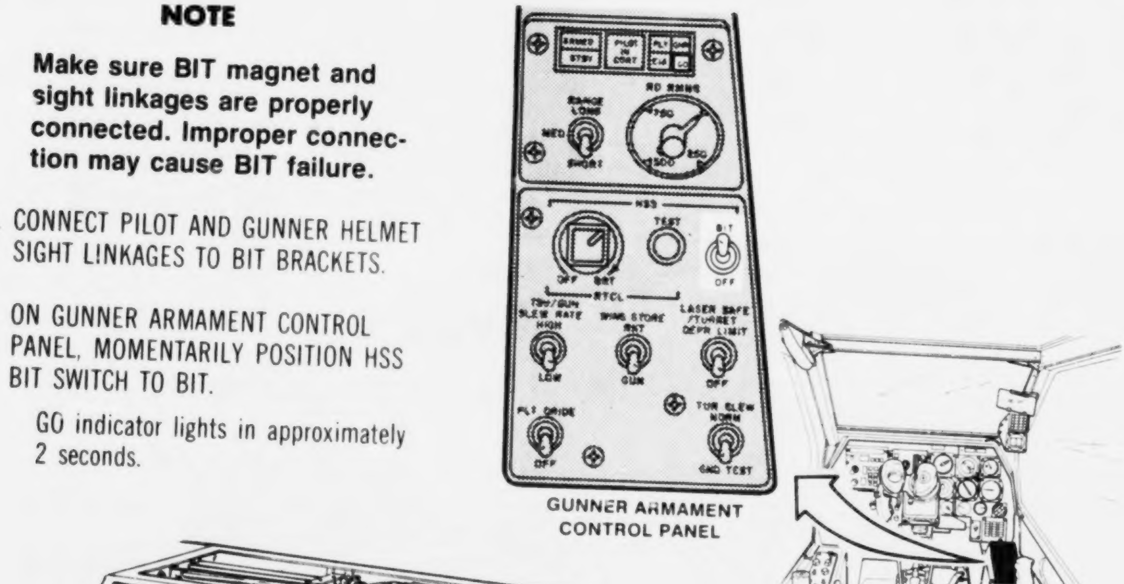
NOTE

Make sure BIT magnet and sight linkages are properly connected. Improper connection may cause BIT failure.

92. CONNECT PILOT AND GUNNER HELMET SIGHT LINKAGES TO BIT BRACKETS.

93. ON GUNNER ARMAMENT CONTROL PANEL, MOMENTARILY POSITION HSS BIT SWITCH TO BIT.

    GO indicator lights in approximately 2 seconds.


ARMED
STBY
PILOT IN CONT
PLT
GNR
RANGE LONG
MED
SHORT
RD RMNG
750
250
500
0
HSS
TEST
BIT
OFF
OFF
BRT
RTCL
TSU/GUN SLEW RATE
HIGH
LOW
WING STORE
RKT
GUN
LASER SAFE /TURRET DEPR LIMIT
OFF
PLT ORIDE
OFF
TUR SLEW NORM
GND TEST

GUNNER ARMAMENT CONTROL PANEL

ARR82-28102

APPENDIX G - 150 HOUR ARMAMENT SUBSYSTEM CHECK (cont)

150 HOUR CHECK (cont)

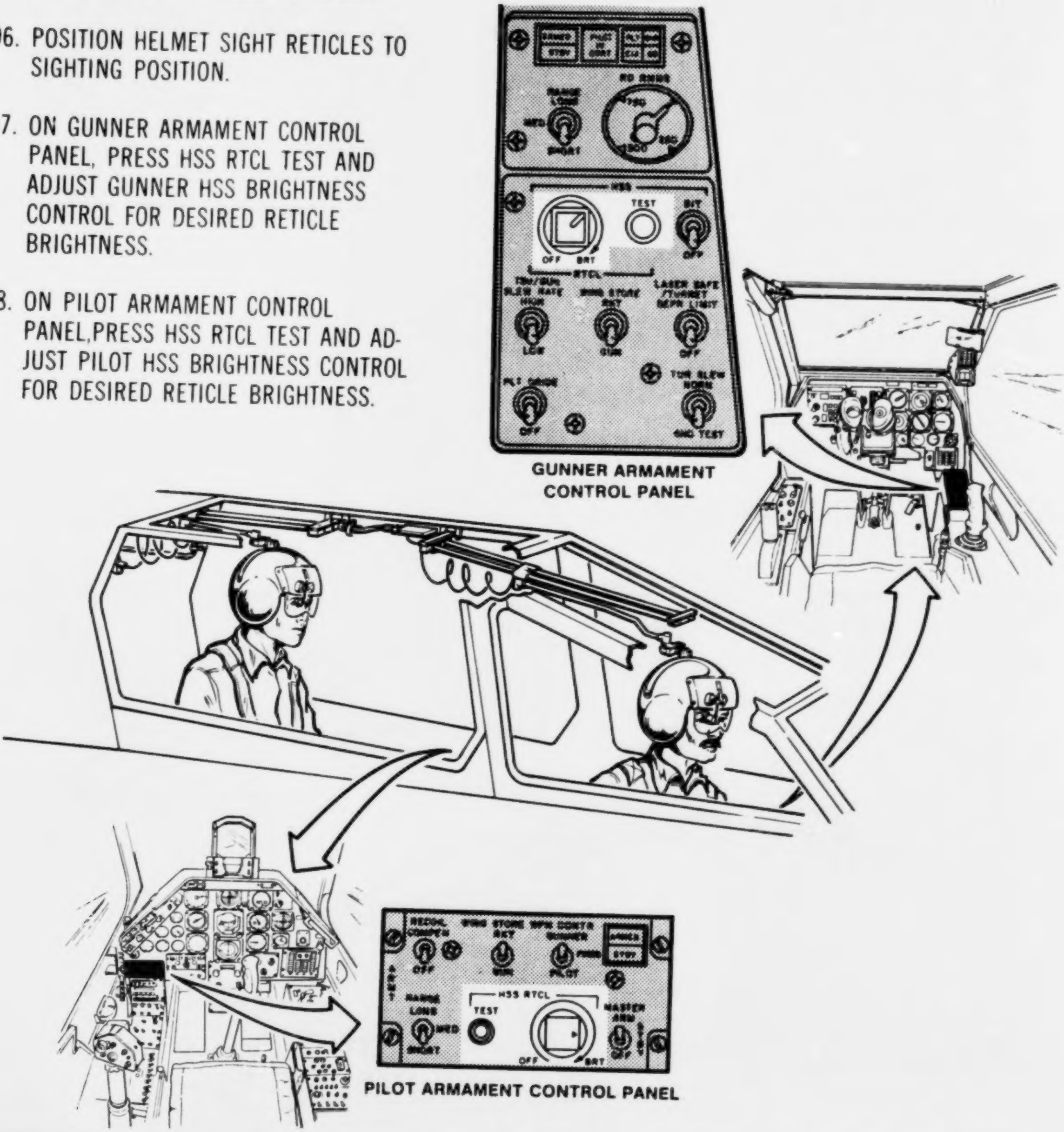
94. CONNECT PILOT AND GUNNER HELMET SIGHT LINKAGES TO HELMET RECEPTACLES.

95. CHECK THAT PILOT AND GUNNER LINKAGES SLIDE FREELY ON RAILS.

96. POSITION HELMET SIGHT RETICLES TO SIGHTING POSITION.

97. ON GUNNER ARMAMENT CONTROL PANEL, PRESS HSS RTCL TEST AND ADJUST GUNNER HSS BRIGHTNESS CONTROL FOR DESIRED RETICLE BRIGHTNESS.

98. ON PILOT ARMAMENT CONTROL PANEL,PRESS HSS RTCL TEST AND ADJUST PILOT HSS BRIGHTNESS CONTROL FOR DESIRED RETICLE BRIGHTNESS.


RANGE
MED
SHORT
HSS
TEST
BIT
OFF
OFF
BRT
RTCL
SLEW RATE
HIGH
LOW
LASER SAFE
/TURRET
OFF
OFF
GND TEST
GUNNER ARMAMENT
CONTROL PANEL
OFF
PILOT
HSS RTCL
TEST
MED
SHORT
OFF
BRT
MASTER
OFF
PILOT ARMAMENT CONTROL PANEL

ARR82-28103

150 HOUR CHECK (cont)

99. ON PILOT ARMAMENT CONTROL PANEL, SET WPN CONTR SWITCH TO PILOT.

100. WITH PILOT HELMET SIGHT (PHS) AT APPROXIMATELY 0° AZ 0° EL, PRESS AND HOLD PILOT CYCLIC STICK ACTION SWITCH.

    a. Turret alines with PHS.

    b. Reticle on steady.

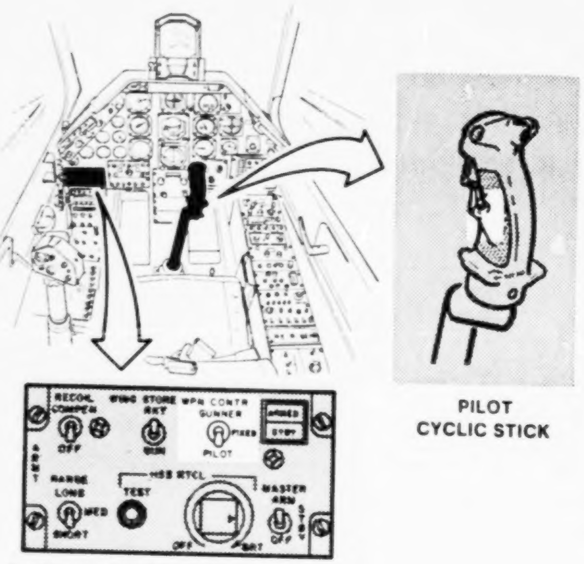
101. SLOWLY MOVE PHS UP, RIGHT, AND LEFT.

    a. Turret follows PHS.

    b. Reticle on steady if turret and PHS are in coincidence.

102. RELEASE PILOT CYCLIC STICK ACTION SWITCH.

    Turret returns to stow position.


RECOIL COMPEN
OFF
WING STORE
RKT
GUN
WPN CONTR
GUNNER
FIXED
PILOT
ARMED
STBY
ARMT
RANGE
LONG
MED
SHORT
HSS RTCL
TEST
OFF
BRT
MASTER ARM
OFF
STBY

PILOT ARMAMENT CONTROL PANEL

PILOT CYCLIC STICK

ARR82-28104

103. WITH PHS AT APPROXIMATELY 0° AZ 0° EL, PRESS PILOT CYCLIC STICK ACTION SWITCH AND TRIGGER SWITCH.

    a. Turret alines with PHS.

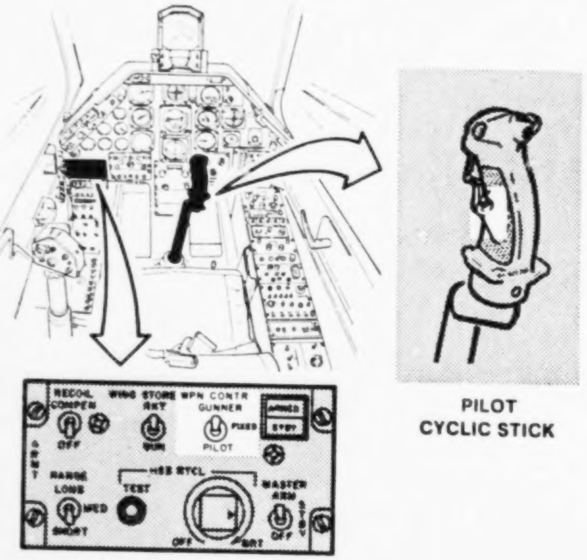
    b. M197 gun rotates.

104. RELEASE PILOT CYCLIC STICK ACTION SWITCH AND TRIGGER SWITCH.

    a. M197 gun stops rotating.

    b. Turret returns to stow position.

105. ON PILOT ARMAMENT CONTROL PANEL, SET WPN CONTR SWITCH TO GUNNER.


RECOIL COMPEN
OFF
WING STORE
RKT
GUN
WPN CONTR
GUNNER
FIXED
PILOT
ARMED
STBY
ARMT
RANGE
LONG
MED
SHORT
HSS RTCL
TEST
OFF
BRT
MASTER ARM
OFF
STBY

PILOT ARMAMENT CONTROL PANEL

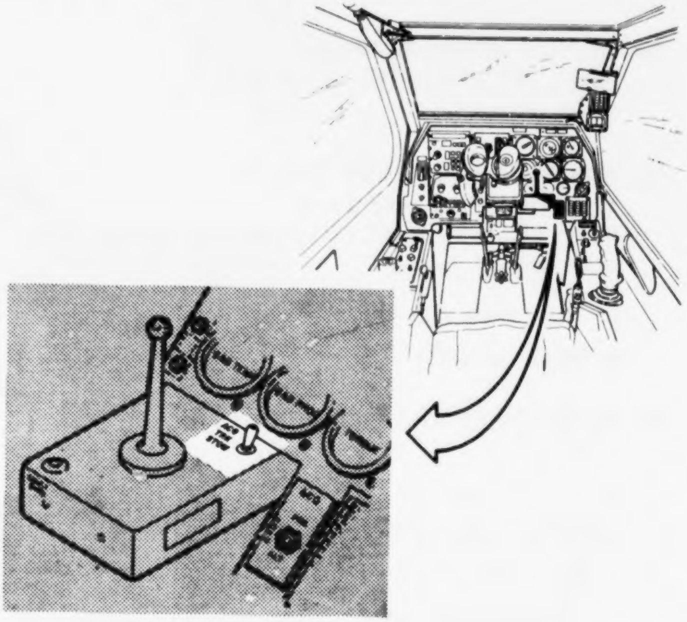
PILOT CYCLIC STICK

ARR82-28105

APPENDIX G - 150 HOUR ARMAMENT SUBSYSTEM CHECK (cont)

150 HOUR CHECK (cont)

106. ON SIGHT HAND CONTROL, HOLD ACQ/TRK/STOW SWITCH TO ACQ AND MOVE GHS UP, DOWN, LEFT, AND RIGHT.
    a. TSU tracks GHS.
    b. Release ACQ/TRK/STOW switch.
    c. GHS reticle retracts.

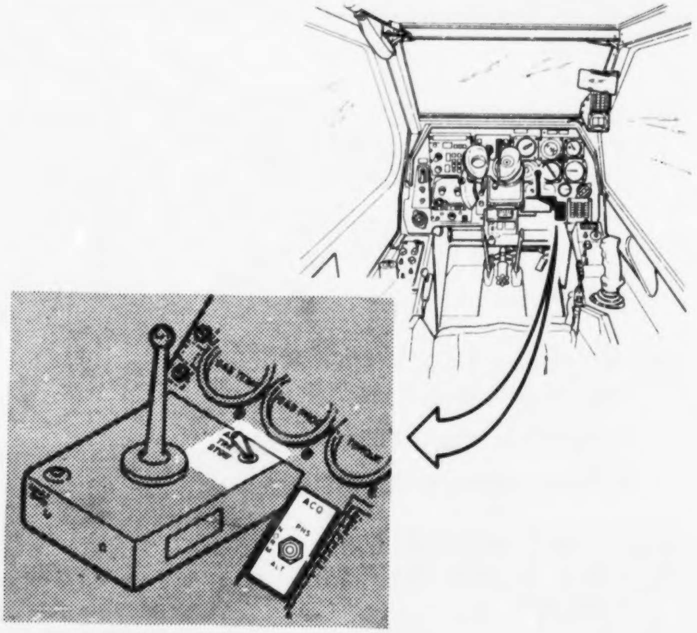


SIGHT HAND CONTROL BOX

ARR82-28106

107. ON ACQ PANEL, HOLD PHS/NORM/ALT SWITCH TO PHS AND MOVE PHS UP, DOWN, LEFT AND RIGHT.
    a. TSU tracks PHS.
    b. Release PHS ACQ SWITCH.

108. ON SIGHT HAND CONTROL, SET ACQ/TRK/STOW SWITCH TO STOW.



SIGHT HAND CONTROL BOX

ARR82-28107

150 HOUR CHECK (cont)

109. ON GUNNER ARMAMENT CONTROL PANEL, SET PLT ORIDE SWITCH TO PLT ORIDE.

     Armed indicator lights.

110. PRESS GUNNER CYCLIC STICK ACTION SWITCH AND MOVE GHS UP, RIGHT, AND LEFT.

     Turret follows GHS movements.

111. PRESS GUNNER CYCLIC STICK TRIGGER SWITCH.

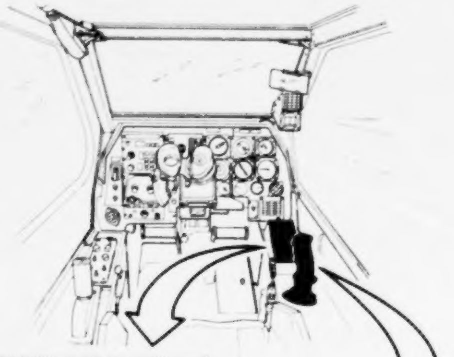
     M197 gun rotates.

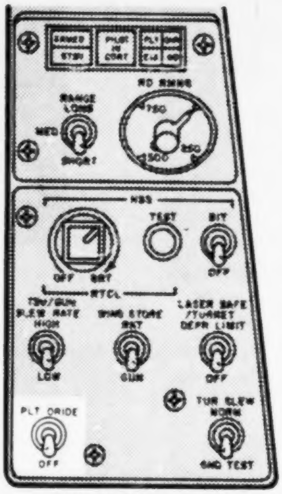
112. RELEASE GUNNER CYCLIC STICK ACTION SWITCH AND TRIGGER SWITCH.

     a. M197 gun stops rotating.

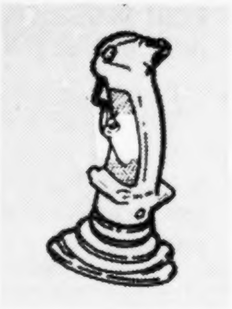
     b. Turret returns to stow position.

113. ON GUNNER ARMAMENT CONTROL PANEL, SET PLT ORIDE SWITCH TO OFF.




ARMED
STBY
PILOT IN CONT
PLT
GND
RD RMNG
750
500
250
RANGE
LONG
MED
SHORT
HSS
TEST
BIT
OFF
OFF
BRT
RTCL
TSU/GUN SLEW RATE
HIGH
LOW
WING STORE
RKT
GUN
LASER SAFE /TURRET DEPR LIMIT
OFF
TUR SLEW
NORM
GND TEST
PLT ORIDE
OFF

GUNNER ARMAMENT CONTROL PANEL

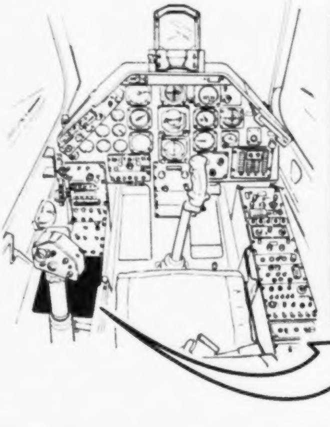


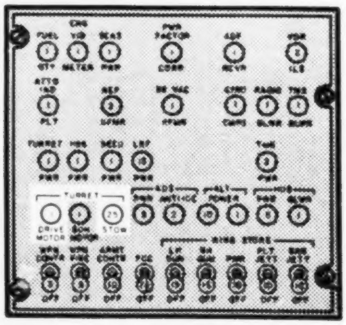
GUNNER CYCLIC STICK

ARR82-28108

114. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, CHECK THAT TURRET STOW CIRCUIT BREAKER IS OPEN.

115. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, OPEN TURRET DRIVE MOTOR CIRCUIT BREAKER.




FUEL
QTY
ENG
VID
METER
PWR
FACTOR
CORR
ILS
ATTD
IND
PLT
TURRET
PWR
PWR
PWR
PWR
PWR
TURRET
DRIVE
MOTOR
STOW
25
WING STORE
OFF

AC / ARMAMENT CIRCUIT BREAKER PANEL

ARR82-28109

APPENDIX G - 150 HOUR ARMAMENT SUBSYSTEM CHECK (cont)

150 HOUR CHECK (cont)

CAUTION

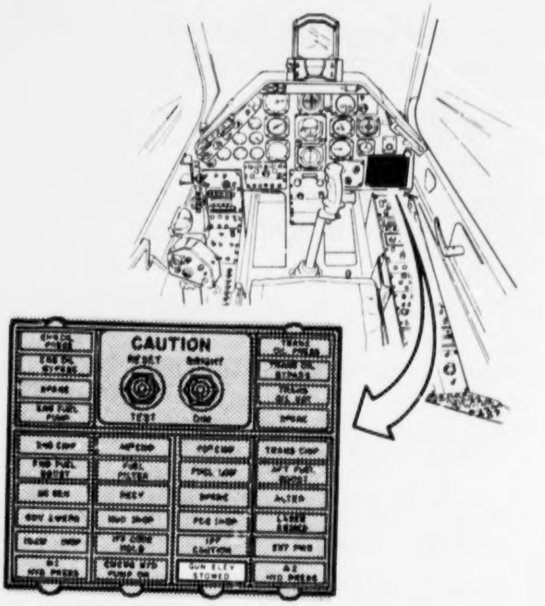
Make sure barrels are supported to prevent barrels from striking ground.

116. SET ELEVATION AND AZIMUTH DRIVE MOTOR BRAKE HANDLES TO UNLOCKED POSITION.

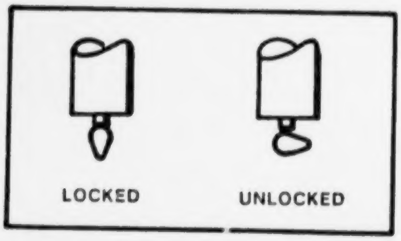
117. MANUALLY POSITION TURRET TO RIGHT MECHANICAL LIMIT AND MAXIMUM DEPRESSION ALLOWABLE.

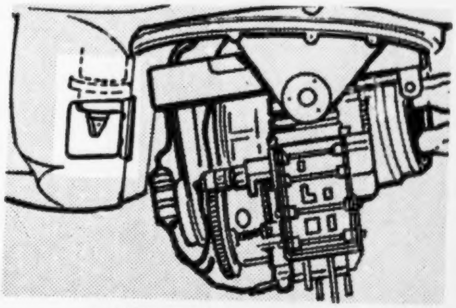
   On pilot caution panel, GUN ELEV STOWED indicator out.

118. SET ELEVATION AND AZIMUTH DRIVE MOTOR BRAKE HANDLES TO LOCKED POSITION.

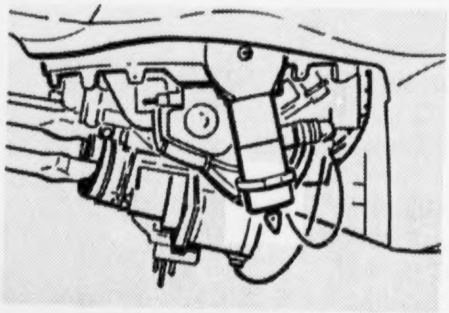

CAUTION
RESET
BRIGHT
TEST
DIM
SPARE
GUN ELEV STOWED

PILOT CAUTION PANEL


LOCKED
UNLOCKED



AZIMUTH DRIVE MOTOR BRAKE HANDLE



ELEVATION DRIVE MOTOR BRAKE HANDLE

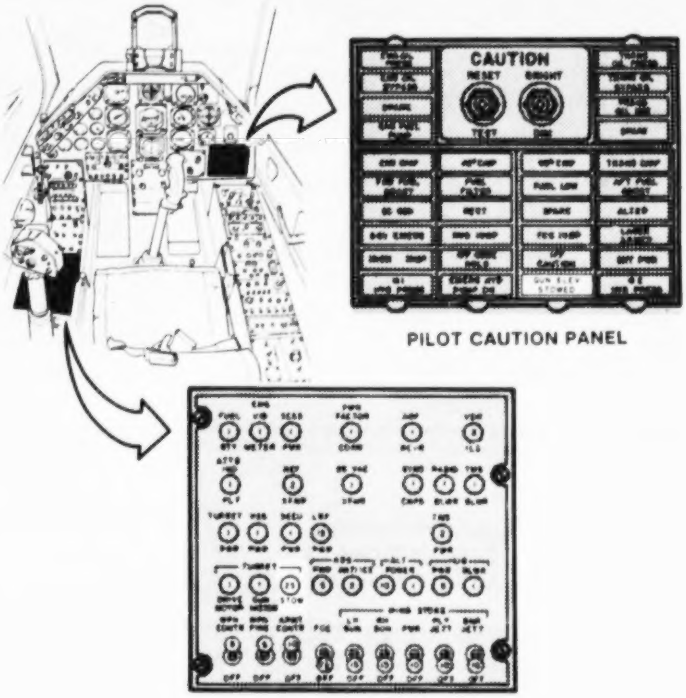
150 HOUR CHECK (cont)

CAUTION

Do not leave turret stow circuit breaker closed for more than 10 seconds if turret fails to move to stow position. Damage to emergency stow control unit may occur.

119. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, CLOSE TURRET STOW CIRCUIT BREAKER.
    a. Turret moves to stow position.
    b. On pilot caution panel, GUN ELEV STOWED indicator lights.

120. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, OPEN TURRET STOW CIRCUIT BREAKER.



PILOT CAUTION PANEL

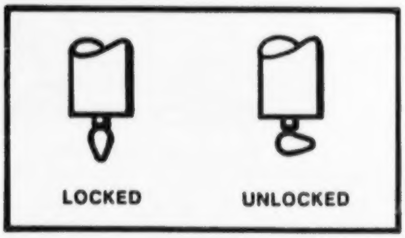
AC / ARMAMENT CIRCUIT BREAKER PANEL

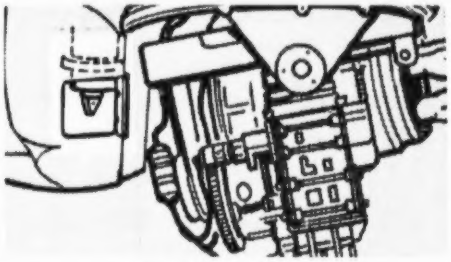
ARR83-2411A

CAUTION

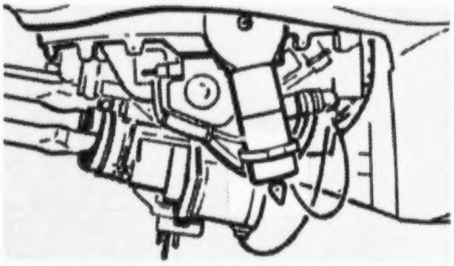
Make sure barrels are supported to prevent barrels from striking ground.

121. SET ELEVATION AND AZIMUTH DRIVE MOTOR BRAKE HANDLES TO UNLOCKED POSITION.





AZIMUTH DRIVE MOTOR BRAKE HANDLE



ELEVATION DRIVE MOTOR BRAKE HANDLE

ARR83-2412A

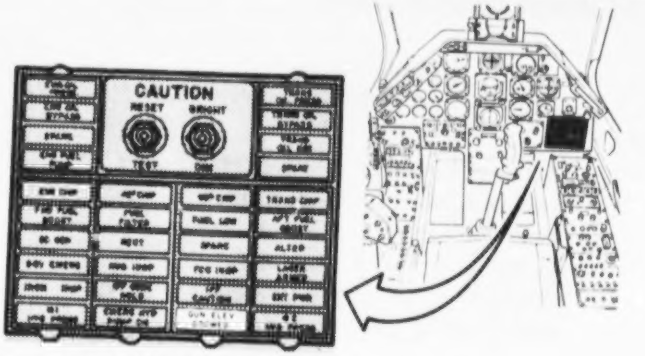
APPENDIX G - 150 HOUR ARMAMENT SUBSYSTEM CHECK (cont)

150 HOUR CHECK (cont)

122. MANUALLY POSITION TURRET TO LEFT MECHANICAL LIMIT AND MAXIMUM DEPRESSION ALLOWABLE.

    GUN ELEV STOWED indicator out.

123. SET ELEVATION AND AZIMUTH DRIVE MOTOR BRAKE HANDLES TO LOCKED POSITION.


CAUTION
RESET
BRIGHT
TEST
DIM
GUN ELEV STOWED
ARR83-2413A

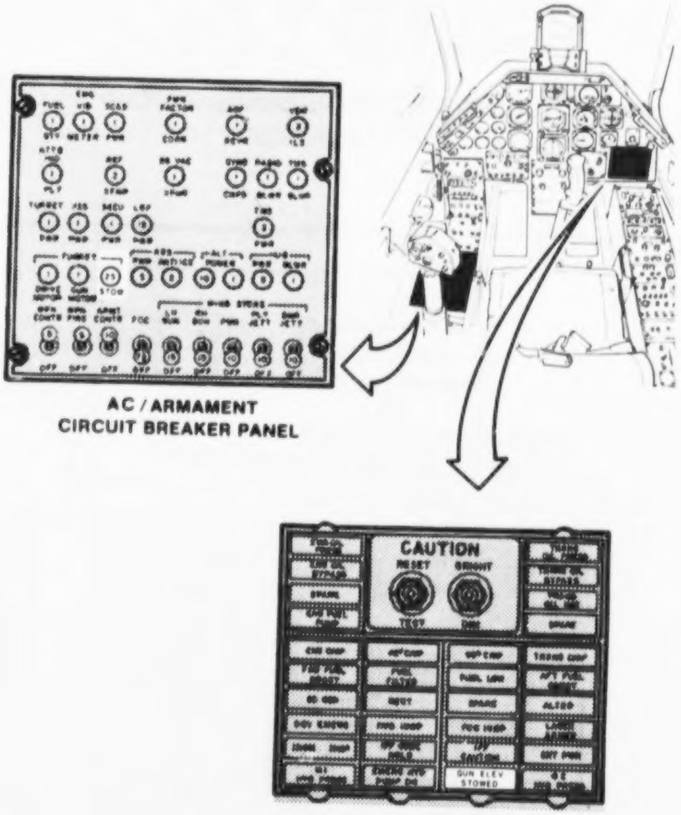
PILOT CAUTION PANEL

CAUTION

Do not leave turret stow circuit breaker closed for more than 10 seconds if turret fails to move to stow position. Damage to emergency stow control unit may occur.

124. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, CLOSE TURRET STOW CIRCUIT BREAKER.
    a. Turret moves to stow position.
    b. On pilot caution panel, GUN ELEV STOWED indicator lights.

125. ON AC/ARMAMENT CIRCUIT BREAKER PANEL, OPEN TURRET STOW CIRCUIT BREAKER.

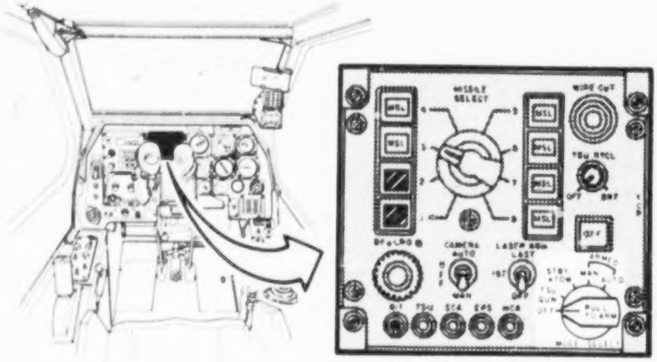

TURRET
STOW
CAUTION
RESET
BRIGHT
TEST
DIM
GUN ELEV STOWED
ARR83-2414A

AC / ARMAMENT CIRCUIT BREAKER PANEL

PILOT CAUTION PANEL

150 HOUR CHECK (cont)

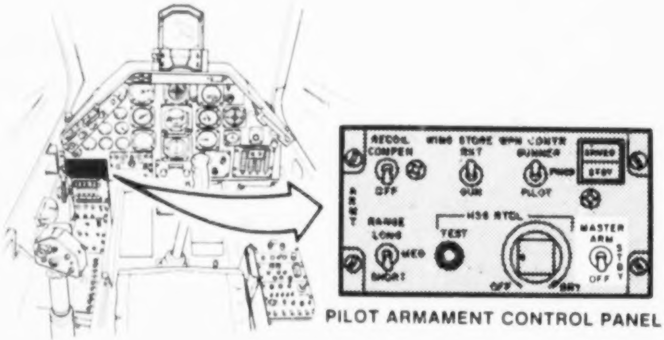
126. ON TOW CONTROL PANEL, SET MODE SELECT SWITCH TO OFF.


MISSILE SELECT
WIRE CUT
MSL
TSU RTCL
OFF
BRT
OFF
CAMERA
AUTO
MAN
LASER ARM
LAST
1ST
OFF
STBY
ARMED
MAN
AUTO
TSU
GUN
OFF
PULL TO ARM
BIT
TSU
SCA
EPS
HCA

TOW CONTROL PANEL

ARR82-28111

127. ON PILOT ARMAMENT CONTROL PANEL, SET MASTER ARM SWITCH TO OFF.


RECOIL COMPEN
OFF
WING STORE RST
GUN
WPN CONTR
GUNNER
PILOT
ARMED
STBY
RANGE
LONG
MED
SHORT
HSS RTCL
TEST
OFF
BRT
MASTER ARM
OFF
STBY

PILOT ARMAMENT CONTROL PANEL

ARR82-28112

128. REMOVE HELMET SIGHT LINKAGES AND SECURE IN STOW BRACKETS.

129. REMOVE POWER, SEE ELECTRICAL POWER APPLICATION/REMOVAL, PARA 2-7.

130. DISCONNECT AND STOW PHS AND GHS HELMETS.

131. DISCONNECT ROCKET PRESENT SIMULATORS.

132. INSTALL ALL PANELS AND FAIRINGS REMOVED, SEE TM 55-1520-236-23.

END OF TEST

GLOSSARY

AADS	Airspeed and Direction Sensor
ACQ	Acquisition
ADS	Air Data Subsystem
ALT	Airborne Laser Tracker
AP	Articulated Pylon
ATS	Acquisition/Track/Stow (Switch on SHC)
ATTK	Attack (Flag in PSI, Light in TSU)
AZ	Azimuth
BAGSE	Boresight Alinement Ground Support Equipment
BIT	Built-In-Test
BITE	Built-In-Test Equipment
BKC	Boresight Kit Case
BL	Buttline (Fuselage Lateral Lines from Center Line)
CCA	Circuit Card Assembly
CCW	Counterclockwise
CW	Clockwise
DNS	Doppler Navigation System
EIA	Electronic Interface Assembly (HSS)
EL	Elevation
EPS	Electronic Power Supply (TMS)
EPU	Electronic Processing Unit
ESCU	Emergency Stow Control Unit
FCC	Fire Control Computer
FCS	Fire Control System
FCSTS	Fire Control Subsystem Test Set (HSS)
FFAR	Folding Fin Aerial Rocket
FOV	Field-of-View
FS	Fuselage Station (Fuselage Longitudinal Lines)
FRL	Fuselage Reference Line
FRP	Fuselage Reference Plane
GACP	Gunner's Armament Control Panel (UTS)
GAZAP	Gunner's Accuracy Control Panel (Used with TMS)
GCU	Gun Control Unit
GHS	Gunner Helmet Sight (HSS)
HSS	Helmet Sight Subsystem
HUD	Head Up Display
IFCU	Interface Control Unit
IR	Infared
I_t	Resolver Error Signal Cos Az Cos El
J_t	Resolver Error Signal Sin Az Cos El
K_t	Resolver Error Signal Sin El
LAI	Low Airspeed Indicator
LASER	Light Amplification by Stimulated Emission of Radiation
LCU	Logic Control Unit

LHG	Left Hand Grip
LOD	Linkage Orientation Device
LOS	Line-of-Sight
LRF	Laser Range Finder
LRU	Line Replaceable Unit
MAG	Magnification (TMS)
PACP	Pilot's Armament Control Panel (UTS)
PMCS	PREVENTIVE MAINTENANCE, CHECKS AND SERVICES
PFS	Pilot Fixed Sight
RMS	Rocket Management Subsystem
RPSTL	REPAIR PARTS AND SPECIAL TOOLS LIST
SCAS	Stability and Control Augmentation System
SHC	Sight Hand Control
SRU	Shop Replaceable Unit
TBA	Turret Buffer Amplifier
TCP	TOW Control Panel (TMS)
TCU	Turret Control Unit (UTS)
TML	TOW Missile Launcher
TOW	Tube-Launched, Optically Tracked, Wire-Guided Command Link Missile
TSEM	TOW System Evaluator Missile (Part of TSGMS)
TSGMLACA	Test Set, Guided Missile Amplitude Control Assy
TSGMS	Test Set, Guided Missile System (Formerly TASTS)
TSU	Telescopic Sight Unit
UTS	Universal Turret Subsystem
UUT	Unit Under Test
V_S	Velocity Jump Correction Voltage
WL	Waterline (Fuselage Vertical Lines)
WS	Wing Station (Wing Lateral Lines)

INDEX

Subject, Paragraph

A

Acquisition Switch Panel and Switch
  Checkout—Switch, 3-40
  Repair, 3-73
Acquisition Test, 3-24
Airspeed Transducer
  Removal/Installation, 3-74
Ammunition
  Description and Identification, 5-2
  Downloading, 2-5
  Handling Test, 3-31
  Loading, 2-11
Ammunition Feed System
  Equipment Data, 1-11
  Location and Description, 1-9
  Removal/Installation, 3-59
  Repair
    Ammunition Box, 3-60
    Booster, 3-62
    Cover Assembly, 3-61
    Feed Chute, 3-63
Armament Subsystem Check—150 Hour, Appendix G
Assembly
  Ammunition Box, 3-60
  Ammunition Chute, 3-63
  Booster, 3-62
  Breech Bolt (11010157), 3-50
  Breech Bolt (11691422), 3-49
  Cover Assembly, 3-61
  Feed Chute, 3-63
  Firing Contact, 3-48
  Index Pin, 3-51
  Mid-Barrel Clamp, 3-47
  M197 Gun, 3-46
  M89E1 Feeder, 3-42
  Universal Boresight Kit, 4-1

B

Barrel Erosion Gage 20-mm—Repair, 4-2

Subject, Paragraph

C

Cable Connections—Test Set, 3-17
Checkout
  Acquisition Switch, 3-40
  Breech Bolt (11010157), 3-50
  Breech Bolt (11691422), 3-49
  Firing Contact, 3-48
  Logic Relay Assembly, 3-40.1
  M197 Gun, 3-46
  M89E1 Feeder, 3-43
  Turret Buffer Amplifier, 3-40.2
Checks—Line Replaceable Unit (LRU)
  Acquisition Switch, 3-40
  Emergency Stow Control Unit, 3-33
  Gun Control Unit, 3-35
  Gunner Armament Control Panel, 3-37
  Interface Control Unit, 3-39
  Logic Control Unit, 3-34
  Pilot Armament Control Panel, 3-38
  Turret Control Unit, 3-36
Cleaning
  Ammunition Box, 3-60
  Azimuth and Elevation Mechanical Components, 3-57
  Barrel Erosion Gage—20-mm, 4-2
  Booster, 3-62
  Breech Bolt (11010157), 3-50
  Breech Bolt (11691422), 3-49
  Cable Mounting Hardware, 3-58
  Cover Assembly, 3-61
  Feed Chute, 3-63
  Firing Contact, 3-48
  Index Pin, 3-51
  Mid-Barrel Clamp, 3-47
  M197 Gun, 3-47
  M89E1 Feeder, 3-42
  Turret Electrical Component, 3-56
  Universal Boresight Kit, 4-1
Coincidence Test, 3-29
Common Tools and Equipment, 3-1
Corrosion Prevention Control (CPC), 1-7.1
Cross Reference List-Nomenclature, 1-6

Subject, Paragraph

D

Depression Limit Test, 3-21
Destruction of Army Materiel to
  Prevent Enemy Use, 1-3
Differences Between Models, 1-10
Disassembly
  Ammunition Box, 3-60
  Booster, 3-62
  Breech Bolt (11010157), 3-50
  Breech Bolt (11691422), 3-49
  Cover Assembly, 3-61
  Feed Chute, 3-63
  Firing Contact, 3-48
  Index Pin, 3-51
  Mid-Barrel Clamp, 3-47
  M197 Gun, 3-46
  M89E1 Feeder, 3-42
  Universal Boresight Kit, 4-1
Downloading Ammunition, 2-5

E

Electrical Power Application/Removal, 2-7
Emergency Stow Control Unit
  Checkout, 3-33
  Removal/Installation, 3-64
Emergency Stow Test, 3-30
Equipment
  Characteristics, Capabilities, and Features, 1-8
  Data, 1-11
Expendable Supplies and Materials, 3-5,
Appendix D

F

Fabricated or Manufactured Items, Appendix E
Fault Symptom Index, 3-16
Fixed Forward Test, 3-25
Functional Description, 1-14

G

GHS and PHS Control of Turret Test, 3-22
Gun Control Unit
  Checkout, 3-35

Subject, Paragraph

G (cont)

  Removal/Installation, 3-66
Gun Drive
  Removal/Installation, 3-53
Gun Function Test, 3-26
Gunner Armament Control Panel
  Checkout, 3-37
  Removal/Installation, 3-68

H

Helicopter Armament Subsystem
  Maintenance Setup, 2-6
Helicopter Armament Subsystem
  150 Hour Check, Appendix G

I

Inspection
  Acquisition Switch Panel and Switch, 3-73
  Ammunition Box, 3-60
  Feed Chute, 3-63
  Ammunition Feed System, 3-59
  Azimuth and Elevation Mechanical
    Components, 3-57
  Mid-Barrel Clamp, 3-47
  Barrel Erosion Gage—20-mm, 4-2
  Booster, 3-62
  Breech Bolt (11010157), 3-50
  Breech Bolt (11691422), 3-49
  Cable Mounting Hardware, 3-58
  Cover Assembly, 3-61
  Firing Contact, 3-48
  Index Pin, 3-51
  M197 Gun, 3-46
  M89E1 Feeder, 3-42
  Turret Electrical Components, 3-56
  Universal Boresight Kit, 4-1
Inspection Services and Setup Instructions—
  Upon Receipt, 2-2
Installation (See Removal/Installation)
Interface Control Unit
  Checkout, 3-39
  Removal/Installation, 3-70

Subject, Paragraph

L

- Logic Control Unit
  - Checkout, 3-34
  - Removal/Installation, 3-65
- Logic Relay Assembly
  - Checkout, 3-40.1
  - Removal/Installation, 3-72

M

- Maintenance Allocation Chart, Appendix B
- Maintenance Forms Records and Reports, 1-2
- Maintenance—General
  - Cleaning, 3-10
  - Inspection, 3-11
  - Preparation, 3-9
  - Repair, 3-12
- Major Components—Location and Description, 1-9
- M197 Gun
  - Equipment Data, 1-11
  - Installation, 3-52
  - Location and Description, 1-9
  - Removal, 3-45
  - Removal/Installation of M197 Gun Barrels, 3-44
  - Repair
    - Breech Bolt (11010157), 3-50
    - Breech Bolt (11691422), 3-49
    - Firing Contact, 3-48
    - Index Pin, 3-51
    - Mid-Barrel Clamp, 3-47
    - M197 Gun, 3-46
- M89E1 Feeder
  - Checkout, 3-43
  - Equipment Data, 1-11
  - Location and Description, 1-9
  - Removal/Installation, 3-41
  - Repair, 3-42

N

- Nomenclature Cross-Reference List, 1-6

Subject, Paragraph

P

- Pilot Armament Control Panel
  - Checkout, 3-38
  - Removal/Installation, 3-69
- Pilot Override Test, 3-23
- Preoperational Check, Turret Subsystem, 2-8
- Preparation for Storage or Shipment, 1-4
- Preventive Maintenance
  - Checks and Services, 3-7
  - Responsibility, 3-6
- Proximity Switch Test, 3-20

Q

- Quality Assurance/Quality Control, 1-5
- Quick Check Boresight, 2-9

R

- Recoil Adapter and Slider
  - Equipment Data, 1-11
  - Location and Description, 1-9
  - Removal/Installation, 3-54
  - Repair, 3-55 and 3-55.1
- Reference Publications, Appendix A
- Removal/Installation
  - Acquisition Switch Panel and Switch, 3-73
  - Airspeed Transducer, 3-74
  - Ammunition Feed System, 3-59
  - Azimuth and Elevation Mechanical Components, 3-57
  - Cable Mounting Hardware, 3-58
  - Emergency Stow Control Unit, 3-64
  - Gun Control Unit, 3-66
  - Gun Drive, 3-53
  - Gunner Armament Control Panel, 3-68
  - Interface Control Unit, 3-70
  - Logic Control Unit, 3-65
  - Logic Relay Assembly, 3-72
  - M197 Gun Barrels, 3-44
  - M197 Gun—Installation, 3-52
  - M197 Gun—Removal, 3-45
  - M197 Gun Barrels, 3-44

Subject, Paragraph

R (cont)

- M89E1 Feeder, 3-41
- Pilot Armament Control Panel, 3-69
- Recoil Adapter and Slider, 3-54
- Turret Buffer Amplifier, 3-71
- Turret Control Unit, 3-67
- Turret Electrical Components, 3-56

Repair
- Acquisition Switch Panel and Switch, 3-73
- Ammunition Box, 3-60
- Azimuth and Elevation Mechanical Components, 3-57
- Barrel Erosion Gage—20-mm, 4-2
- Booster, 3-62
- Breech Bolt (11010157), 3-50
- Breech Bolt (11691422), 3-49
- Cable Mounting Hardware, 3-58
- Cover Assembly, 3-61
- Feed Chute, 3-63
- Firing Contact, 3-48
- Index Pin, 3-51
- Mid-Barrel Clamp, 3-47
- M197 Gun, 3-46
- M89E1 Feeder, 3-42
- Recoil Adapter, 3-55
- Slider, 3-55.1
- Turret Electrical Components, 3-56
- Universal Boresight Kit, 4-1

Repair Parts, 3-3, Appendix C
Reporting Equipment Improvement Recommendations (EIR), 1-7
Rocket Launcher Alinement, 2-10

S

Safety, Care, and Handling, 1-12
Safing Inspection, 2-4

Subject, Paragraph

S (cont)

SCAS Test, 3-28
Sight Bypass Procedure, 3-18
Special Tools TMDE and Support Equipment, 3-2
Storage or Shipment—Preparation, 1-4
System Testing, 3-14

T

Tool and Test Equipment Requirements, Appendix B
Torque Limits, Appendix F
Troubleshooting, 3-15
TSU Control of Turret Test, 3-19
TSU Range Compensation Test, 3-27
Turret
- Location and Description, 1-9
- Repair
  - Azimuth and Elevation Mechanical Components, 3-57
  - Cable Mounting Hardware, 3-58
  - Electrical Components, 3-56

Turret Buffer Amplifier
- Checkout, 3-40.2
- Removal/Installation, 3-71

Turret Control Unit
- Checkout, 3-36
- Removal/Installation, 3-67

Turret Subsystem
- Equipment Data, 1-11
- Location and Description, 1-9
- Preoperational Check, 2-8

U

Universal Boresight Kit—Repair, 4-1

By Order of the Secretary of the Army:

JOHN A. WICKHAM, JR.
General, United States Army
Chief of Staff

Official:

R. L. DILWORTH
Brigadier General, United States Army
The Adjutant General

DISTRIBUTION:

To be distributed in accordance with DA Form 12-31A, Organizational maintenance requirememts for Armament Subsystem: Gun, Automatic, 20-MM, M97E1.

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

THEN. . JOT DOWN THE DOPE ABOUT IT ON THIS FORM, CAREFULLY TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL!

SOMETHING WRONG WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 9-1090-206-20-1	3 Mar 86	M97A2 20-MM Automatic Gun Helicopter Armament Subsystem

BE EXACT. PIN-POINT WHERE IT IS

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO	IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
2-34	2-8			TSU Reticle figure should show G in relief

SAMPLE

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ARE OBSOLETE.

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

THEN. . JOT DOWN THE DOPE ABOUT IT ON THIS FORM, CAREFULLY TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL!

SOMETHING WRONG WITH THIS PUBLICATION?

FROM (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER TM 9-1090-206-20-1	PUBLICATION DATE 3 March 1986	PUBLICATION TITLE 20-MM Automatic Gun Helicopter Armament Subsystem M97A2

BE EXACT . . PIN-POINT WHERE IT IS

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO	IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ARE OBSOLETE.

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS

FILL IN YOUR UNIT'S ADDRESS

FOLD BACK

TEAR ALONG PERFORATED LINE

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 12062 WASHINGTON, DC

POSTAGE WILL BE PAID BY DEPARTMENT OF THE ARMY

COMMANDER
US ARMY ARMAMENT, MUNITIONS
AND CHEMICAL COMMAND
ATTN: AMSMC-MAS
ROCK ISLAND, IL 61201-9990

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

THEN. . JOT DOWN THE DOPE ABOUT IT ON THIS FORM, CAREFULLY TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL!

SOMETHING WRONG WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER: TM 9-1090-206-20-1

PUBLICATION DATE: 3 March 1986

PUBLICATION TITLE: 20-MM Automatic Gun Helicopter Armament Subsystem M97A2

BE EXACT. PIN-POINT WHERE IT IS

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO	IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ARE OBSOLETE.

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS

REVERSE OF DA FORM 2028-2 AMSMC OP-103-85

TEAR ALONG PERFORATED LINE

FILL IN YOUR UNIT'S ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 12062 WASHINGTON, DC

POSTAGE WILL BE PAID BY DEPARTMENT OF THE ARMY

COMMANDER
US ARMY ARMAMENT, MUNITIONS
AND CHEMICAL COMMAND
ATTN: AMSMC-MAS
ROCK ISLAND, IL 61201-9990

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

THEN. . JOT DOWN THE DOPE ABOUT IT ON THIS FORM, CAREFULLY TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL!

SOMETHING WRONG WITH THIS PUBLICATION?

FROM (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 9-1090-206-20-1	3 March 1986	20-MM Automatic Gun Helicopter Armament Subsystem M97A2

BE EXACT PIN-POINT WHERE IT IS

PAGE NO	PARAGRAPH	FIGURE NO	TABLE NO	IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ARE OBSOLETE.

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS

REVERSE OF DA FORM 2028-2 AMSMC OP-103-85

TEAR ALONG PERFORATED LINE

FILL IN YOUR
UNIT'S ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 12062 WASHINGTON, DC

POSTAGE WILL BE PAID BY DEPARTMENT OF THE ARMY

COMMANDER
US ARMY ARMAMENT, MUNITIONS
AND CHEMICAL COMMAND
ATTN: AMSMC-MAS
ROCK ISLAND, IL 61201-9990

CHANGE

No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, 27 June 1988

AVAITION UNIT MAINTENANCE MANUAL

FOR

20-MM AUTOMATIC GUN HELICOPTER ARMAMENT SUBSYSTEM: M97A2
PN 9324960 (1005-01-100-4469)

TM 9-1090-206-20-1, 3 March 1986, is changed as follows:

1. Remove old pages and insert new pages as indicated below.

2. New or changed material is indicated by a vertical bar in the margin of the page.

3. New or changed illustrations are indicated by a miniature pointing hand highlighting the change.

4. Upon receipt of this change, ADVANCE COPY Change 1 and Change 2 will be destroyed.

5. Throughout this book obsolete model designators are used. Upon receipt of this change, update all the model designators in the book as follows:

MODEL DESIGNATORS

Obsolete	Current	Obsolete	Current
M97A1	M97A3	M141	M161
M97A2	M97A4	M138	M147
M22	M26		

6. LO 9-1090-206-20, dtd 3 Mar 86, has been incorporated, with changes. Upon receipt of this change, LO 9-1090-206-20 will be rescinded and destroyed.

Remove Pages	Insert Pages	Remove Pages	Insert Pages
i and ii	i and ii	2-25 thru 2-28	2-25 thru 2-28
1-3 and 1-4	1-3 and 1-4	2-31 and 2-32	2-31 and 2-32
1-11 thru 1-14	1-11 thru 1-14	2-35 thru 2-38	2-35 thru 2-38
1-43 and 1-44	1-43 and 1-44	2-57 and 2-58	2-57 and 2-58
1-53 and 1-54	1-53 and 1-54	2-63 thru 2-66	2-63 thru 2-66
1-59 and 1-60	1-59 and 1-60	2-69 and 2-70	2-69 and 2-70
2-1 and 2-2	2-1 and 2-2	3-1 and 3-2	3-1 and 3-2
2-5 thru 2-8	2-5 thru 2-8	None	3-2.1 thru 3-2.12

Remove Pages	Insert Pages	Remove Pages	Insert Pages
3-3 thru 3-6	3-3 thru 3-6	3-213 and 3-214	3-213 and 3-214
3-17 and 3-18	3-17 and 3-18	3-235 and 3-236	3-235 and 3-236
3-23 thru 3-28	3-23 thru 3-28	3-243 thru 3-246	3-243 thru 3-246
3-31 and 3-32	3-31 and 3-32	3-289 and 3-290	3-289 and 3-290
3-35 and 3-36	3-35 and 3-36	3-293 and 3-294	3-293 and 3-294
3-41 and 3-42	3-41 and 3-42	3-295/(3-296 blank)	3-295 and 3-296
3-45 and 3-46	3-45 and 3-46.1/ (3.46.2 blank)	None	3-296.1 and 3-296.2
		3-299 and 3-300	3-299 and 3-300
3-47 and 3-48	3-47 and 3-48	3-300.3 thru 3-300.6	3-300.3 thru 3-300.6
3-53 and 3-54	3-53 and 3-54	3-329 and 3-330	3-329 and 3-330
3-57 thru 3-60	3-57 thru 3-60	None	3-330.1 and 3-330.2
3-73 thru 3-82	3-73 thru 3-82	A-1 and A-2	A-1 and A-2
3-89 and 3-90	3-89 and 3-90	B-3 thru B-8	B-3 thru B-8
3-101 and 3-102	3-101 and 3-102	B-29 and B-30	B-29 and B-30
3-105 thru 3-108	3-105 thru 3-108	G-13 thru G-16	G-13 thru G-16
3-127 and 3-128	3-127 and 3-128	G-17 and G-18	G-17 and G-18
3-167/(3-168 blank)	3-167 thru 3-168.5/ (3-168.6 blank)	G-23 thru G-28	G-23 thru G-28
3-199 thru 3-202	3-199 thru 3-202	Index 1 thru Index 4	Index 1 thru Index 4

7. File this and all previous change sheets in back of the publication for reference purposes.

By Order of the Secretary of the Army:

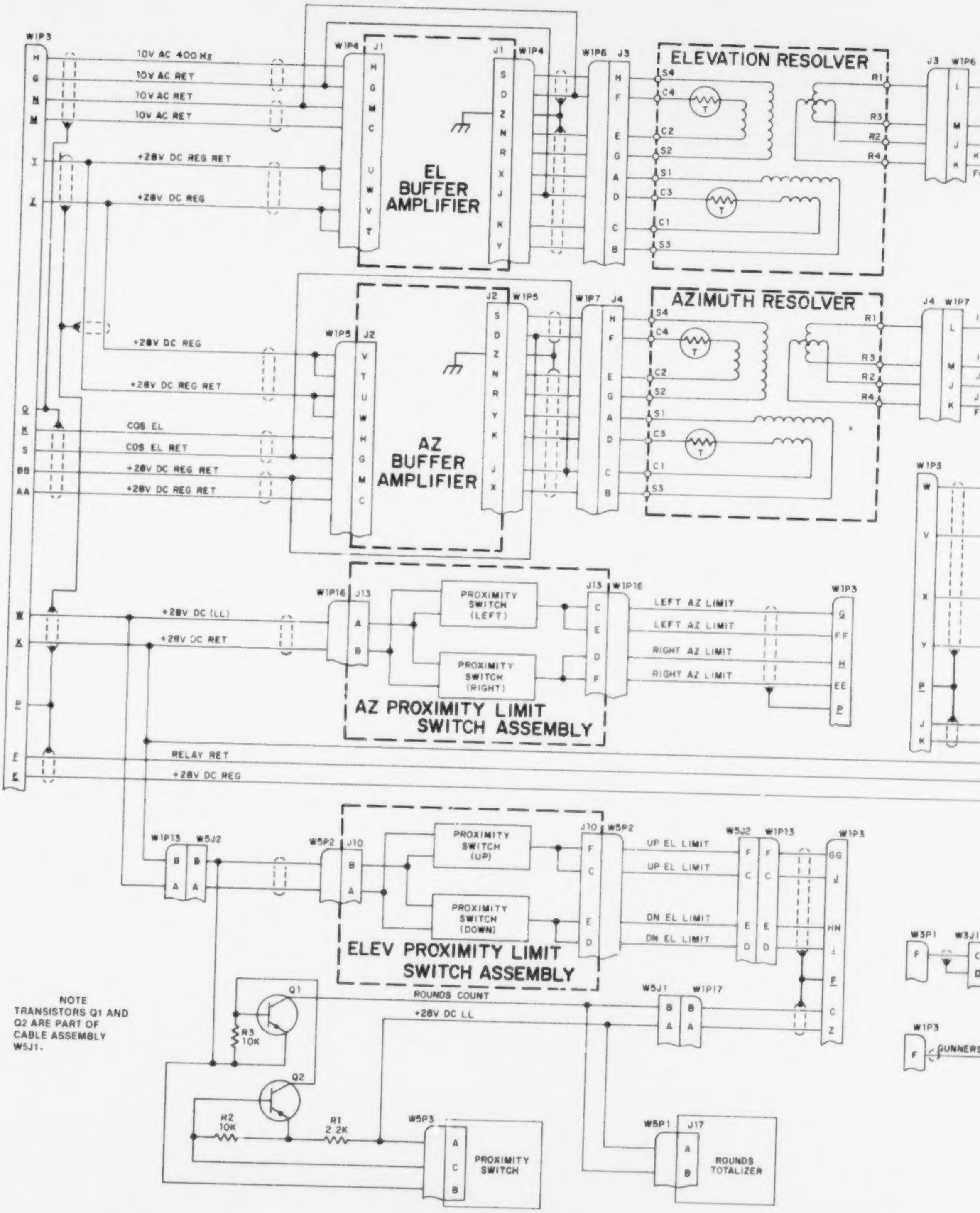
CARL E. VUONO
General, United States Army
Chief of Staff

Official:

R. L. DILWORTH
Brigadier General, United States Army
The Adjutant General

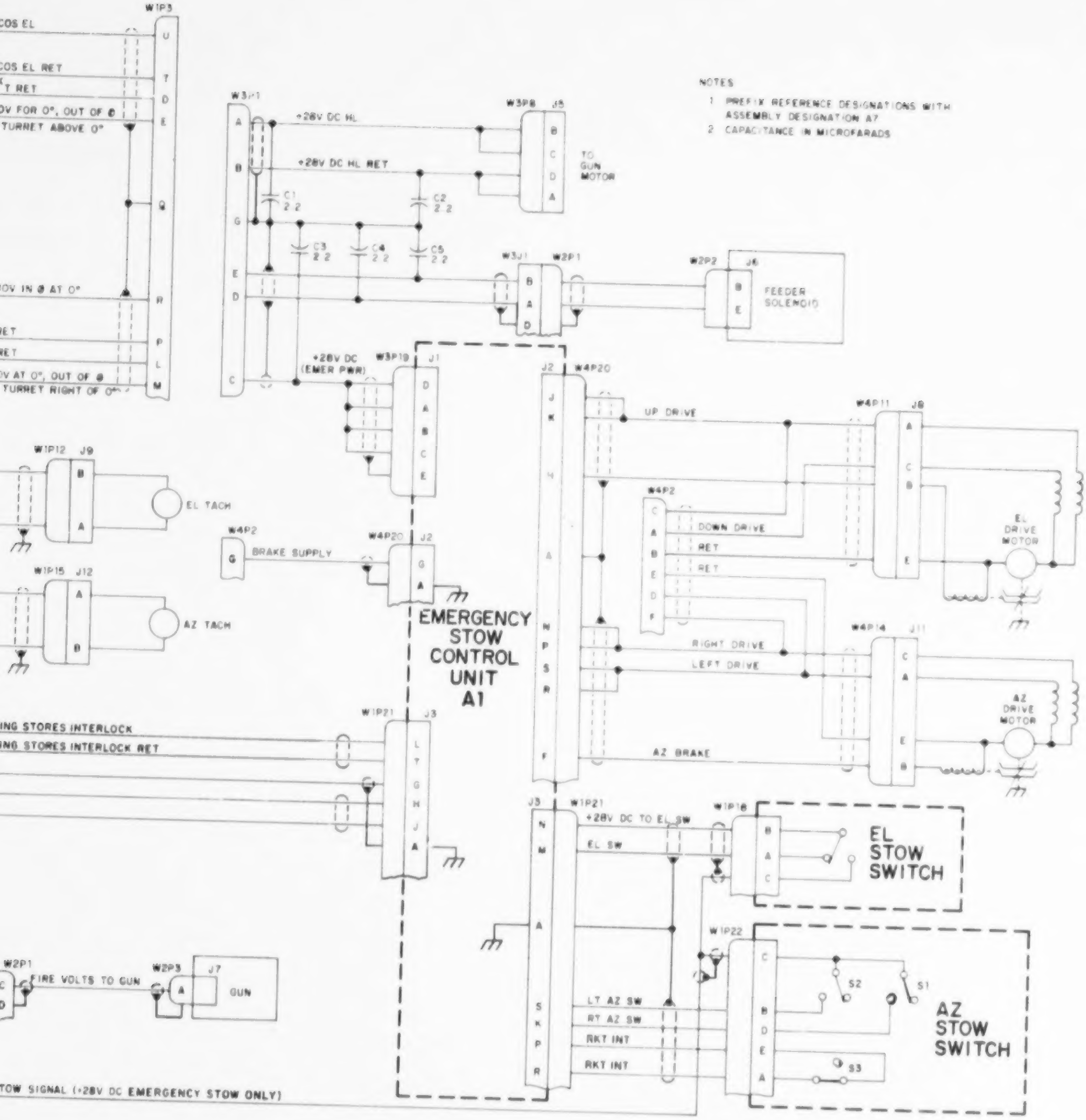
DISTRIBUTION:

To be distributed in accordance with DA Form 12-31A, AVUM Maintenance requirements for Armament Subsystem: Gun, Automatic, 20-MM, M97E1.



W1P3
10V AC 400 Hz
10V AC RET
10V AC RET
10V AC RET
+28V DC REG RET
+28V DC REG
W1P4
J1
EL BUFFER AMPLIFIER
W1P6
J3
ELEVATION RESOLVER
S4
C4
C2
S2
S1
C3
C1
S3
R1
R3
R2
R4
T
J3 W1P6
W1P5
J2
AZ BUFFER AMPLIFIER
W1P7
J4
AZIMUTH RESOLVER
J4 W1P7
+28V DC REG
+28V DC REG RET
COS EL
COS EL RET
+28V DC REG RET
+28V DC REG RET
W1P16
J13
+28V DC (LL)
+28V DC RET
PROXIMITY SWITCH (LEFT)
PROXIMITY SWITCH (RIGHT)
AZ PROXIMITY LIMIT SWITCH ASSEMBLY
LEFT AZ LIMIT
LEFT AZ LIMIT
RIGHT AZ LIMIT
RIGHT AZ LIMIT
RELAY RET
+28V DC REG
W1P13
W5J2
W5P2
J10
PROXIMITY SWITCH (UP)
PROXIMITY SWITCH (DOWN)
ELEV PROXIMITY LIMIT SWITCH ASSEMBLY
UP EL LIMIT
UP EL LIMIT
DN EL LIMIT
DN EL LIMIT
W5J2
W1P13
W1P3
ROUNDS COUNT
+28V DC LL
W5J1
W1P17
Q1
Q2
R3 10K
R2 10K
R1 2.2K
W5P3
PROXIMITY SWITCH
W5P1
J17
ROUNDS TOTALIZER
W3P1
W3J1
W1P3
GUNNERS

NOTE
TRANSISTORS Q1 AND
Q2 ARE PART OF
CABLE ASSEMBLY
W5J1.


W1P3
COS EL
COS EL RET
T RET
OV FOR 0°, OUT OF Ø
TURNET ABOVE 0°
OV IN Ø AT 0°
ET
ET
V AT 0°, OUT OF Ø
TURRET RIGHT OF 0°
U
T
D
E
Q
R
P
L
M
W3P1
A
B
G
E
D
C
+28V DC HL
+28V DC HL RET
C1 2.2
C2 2.2
C3 2.2
C4 2.2
C5 2.2
W3P8
J5
B
C
D
A
TO GUN MOTOR
W3J1
W2P1
B
A
D
W2P2
J6
B
E
FEEDER SOLENOID
+28V DC (EMER PWR)
W3P19
J1
D
A
B
C
E
J2
W4P20
J
K
H
A
N
P
S
R
F
UP DRIVE
W4P11
J8
A
C
B
E
EL DRIVE MOTOR
W4P2
C
A
B
E
D
F
DOWN DRIVE
RET
RET
RIGHT DRIVE
LEFT DRIVE
W4P14
J11
C
A
E
B
AZ DRIVE MOTOR
AZ BRAKE
W1P12
J9
B
A
EL TACH
W4P2
G
BRAKE SUPPLY
W4P20
J2
G
A
W1P15
J12
A
B
AZ TACH
EMERGENCY STOW CONTROL UNIT A1
ING STORES INTERLOCK
ING STORES INTERLOCK RET
W1P21
J3
L
T
G
H
J
A
J3
W1P21
N
M
A
S
K
P
R
+28V DC TO EL SW
EL SW
W1P18
B
A
C
EL STOW SWITCH
W1P22
C
B
D
E
A
S2
S1
S3
LT AZ SW
RT AZ SW
RKT INT
RKT INT
AZ STOW SWITCH
W2P1
C
D
FIRE VOLTS TO GUN
W2P3
A
J7
GUN
TOW SIGNAL (+28V DC EMERGENCY STOW ONLY)

NOTES

1 PREFIX REFERENCE DESIGNATIONS WITH ASSEMBLY DESIGNATION A7
2 CAPACITANCE IN MICROFARADS

ARR83-1590

FO-1. Turret Schematic Diagram

Charts Transposed to

End of Volume.

THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
1 Kilometer = 1000 Meters = 0.621 Miles

WEIGHTS

1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
1 Kilogram = 1000 Grams = 2.2 Lb
1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

SQUARE MEASURE

1 Sq Centimeter = 100 Sq Millimeters = 0.155 Sq Inches
1 Sq Meter = 10,000 Sq Centimeters = 10.76 Sq Feet
1 Sq Kilometer = 1,000,000 Sq Meters = 0.386 Sq Miles

CUBIC MEASURE

1 Cu Centimeter = 1000 Cu Millimeters = 0.06 Cu Inches
1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet

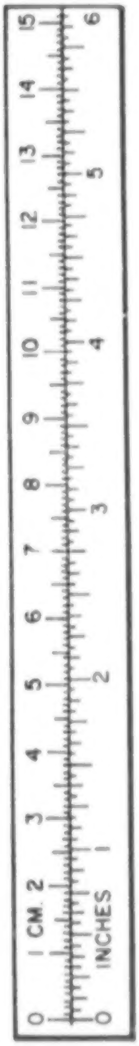
TEMPERATURE

5/9 (°F − 32) = °C
212° Fahrenheit is equivalent to 100° Celsius
90° Fahrenheit is equivalent to 32.2° Celsius
32° Fahrenheit is equivalent to 0° Celsius
9/5 C° + 32 = F°

APPROXIMATE CONVERSION FACTORS

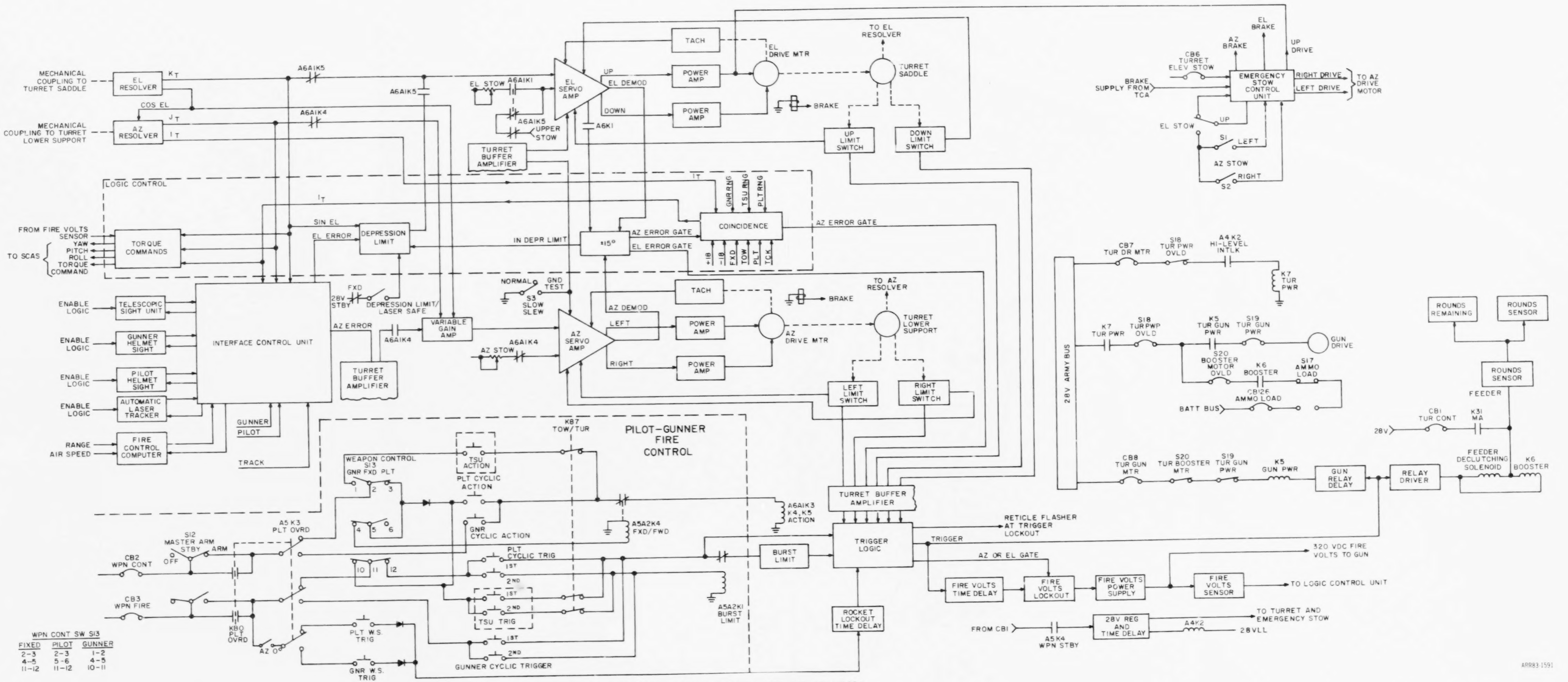
TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
Kilometers per Liter	Miles per Gallon	2.354
Kilometers per Hour	Miles per Hour	0.621



ARRR2 26812

PIN: 059616-000


MECHANICAL COUPLING TO TURRET SADDLE
EL RESOLVER
KT
A6A1K5
COS EL
MECHANICAL COUPLING TO TURRET LOWER SUPPORT
AZ RESOLVER
JT
IT
A6A1K4
EL STOW
A6A1K1
A6A1K5 UPPER STOW
EL SERVO AMP
UP
EL DEMOD
DOWN
A6K1
TURRET BUFFER AMPLIFIER
TACH
POWER AMP
EL DRIVE MTR
TO EL RESOLVER
TURRET SADDLE
BRAKE
UP LIMIT SWITCH
DOWN LIMIT SWITCH
LOGIC CONTROL
GNR RNG
TSU RNG
PLT RNG
COINCIDENCE
AZ ERROR GATE
EL ERROR GATE
IN DEPR LIMIT
±15°
+18
−18
FXD
TOW
PLT
TCK
FROM FIRE VOLTS SENSOR
TO SCAS
YAW
PITCH
ROLL
TORQUE COMMAND
TORQUE COMMANDS
SIN EL
EL ERROR
DEPRESSION LIMIT
28V STBY
FXD
DEPRESSION LIMIT/ LASER SAFE
AZ ERROR
VARIABLE GAIN AMP
NORMAL
GND TEST
S3 SLOW SLEW
AZ DEMOD
AZ STOW
AZ SERVO AMP
LEFT
RIGHT
AZ DRIVE MTR
TO AZ RESOLVER
TURRET LOWER SUPPORT
LEFT LIMIT SWITCH
RIGHT LIMIT SWITCH
ENABLE LOGIC
TELESCOPIC SIGHT UNIT
GUNNER HELMET SIGHT
PILOT HELMET SIGHT
AUTOMATIC LASER TRACKER
INTERFACE CONTROL UNIT
RANGE
AIR SPEED
FIRE CONTROL COMPUTER
GUNNER
PILOT
TRACK
PILOT-GUNNER FIRE CONTROL
K87 TOW/TUR
WEAPON CONTROL S13 GNR FXD PLT
1 2 3
4 5 6
10 11 12
TSU ACTION
PLT CYCLIC ACTION
GNR CYCLIC ACTION
A5A2K4 FXD/FWD
A6A1K3 K4, K5 ACTION
A5 K3 PLT OVRD
S12 MASTER ARM
OFF
STBY
ARM
CB2 WPN CONT
CB3 WPN FIRE
K80 PLT OVRD
AZ
PLT CYCLIC TRIG
1ST
2ND
TSU TRIG
PLT W.S. TRIG
GNR W.S. TRIG
GUNNER CYCLIC TRIGGER
A5A2K1 BURST LIMIT
BURST LIMIT
WPN CONT SW S13
FIXED PILOT GUNNER
2-3 2-3 1-2
4-5 5-6 4-5
11-12 11-12 10-11
TURRET BUFFER AMPLIFIER
TRIGGER LOGIC
RETICLE FLASHER AT TRIGGER LOCKOUT
TRIGGER
AZ OR EL GATE
FIRE VOLTS TIME DELAY
FIRE VOLTS LOCKOUT
FIRE VOLTS POWER SUPPLY
FIRE VOLTS SENSOR
320 VDC FIRE VOLTS TO GUN
TO LOGIC CONTROL UNIT
ROCKET LOCKOUT TIME DELAY
FROM CB1
A5K4 WPN STBY
28V REG AND TIME DELAY
A4K2
TO TURRET AND EMERGENCY STOW
28VLL
EL BRAKE
AZ BRAKE
UP DRIVE
CB6 TURRET ELEV STOW
BRAKE SUPPLY FROM TCA
EMERGENCY STOW CONTROL UNIT
RIGHT DRIVE
LEFT DRIVE
TO AZ DRIVE MOTOR
EL STOW
UP
S1
LEFT
AZ STOW
RIGHT
S2
28V ARMY BUS
CB7 TUR DR MTR
S18 TUR PWR OVLD
A4K2 HI-LEVEL INTLK
K7 TUR PWR
K7 TUR PWR
S18 TUR PWP OVLD
K5 TUR GUN PWR
S19 TUR GUN PWR
GUN DRIVE
S20 BOOSTER MOTOR OVLD
K6 BOOSTER
S17 AMMO LOAD
CB126 AMMO LOAD
BATT BUS
ROUNDS REMAINING
ROUNDS SENSOR
ROUNDS SENSOR
FEEDER
CB1 TUR CONT
K31 MA
28V
CB8 TUR GUN MTR
S20 TUR BOOSTER MTR
S19 TUR GUN PWR
K5 GUN PWR
GUN RELAY DELAY
RELAY DRIVER
FEEDER DECLUTCHING SOLENOID
K6 BOOSTER
ARR83-1591

✩U.S. GOVERNMENT PRINTING OFFICE: 1989 242-451/06160

FO-2. M97A2 Turret Subsystem Functional Block Diagram

best copy available